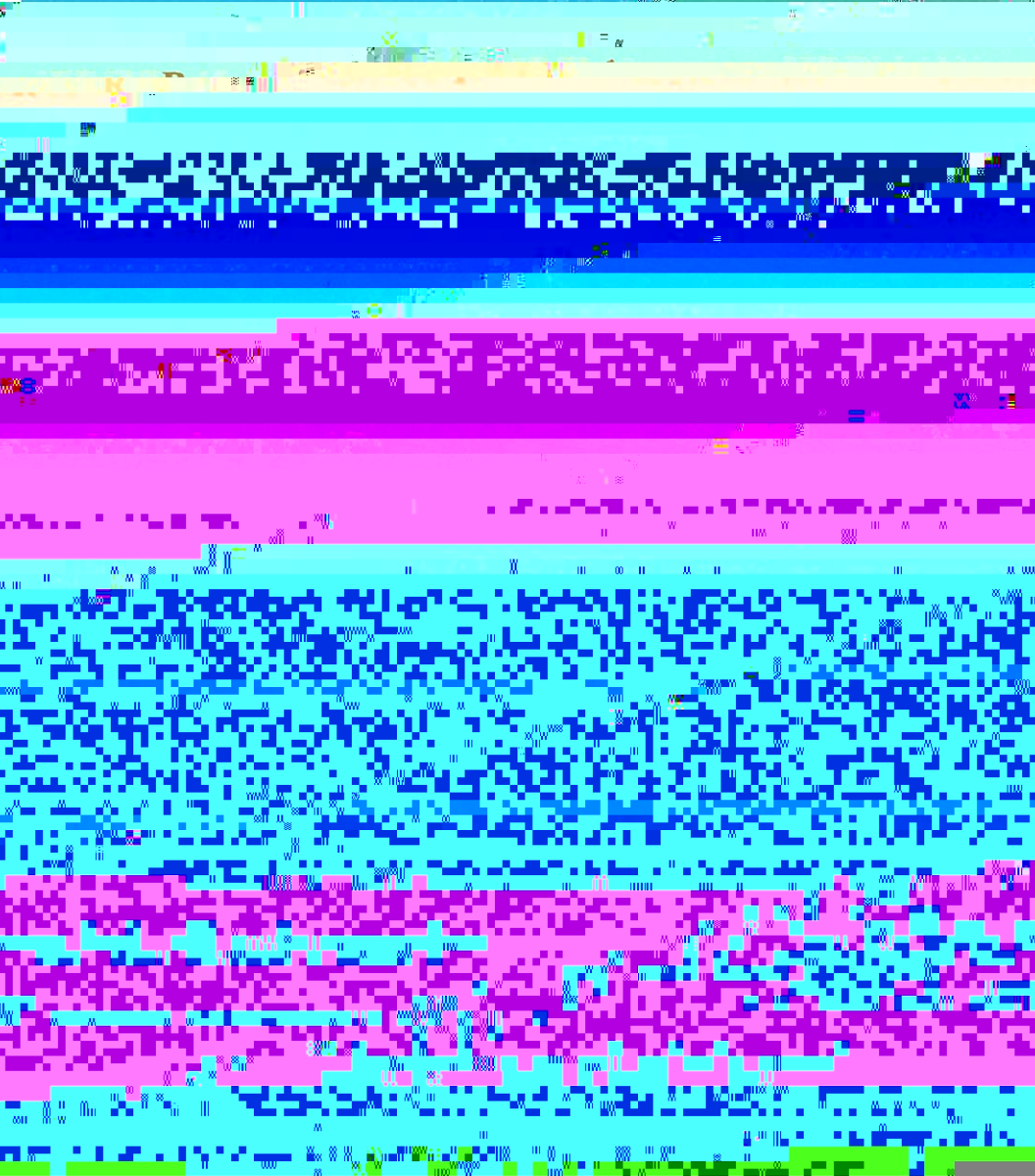


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ON THE INVARIANCE OF A QUANTUM STATE

Paul A. Heston

Abstract

Let ρ be a quantum state. We show that ρ is invariant under a unitary transformation if and only if ρ is a pure state.

1. Introduction

Let ρ be a quantum state. We show that ρ is invariant under a unitary transformation if and only if ρ is a pure state.

We denote the unit sphere in $\mathbb{C}^n$ by S^{n-1} , and let

ρ be a quantum state. We show that ρ is invariant under a unitary transformation if and only if ρ is a pure state.

Lemma 1. For all $n \geq 1$, ρ is a pure state if and only if ρ is a rank one projection.

Lemma 2. If ρ is a pure state, then ρ is invariant under a unitary transformation if and only if ρ is a rank one projection.

Proof of Lemma 1. Let ρ be a quantum state. We show that ρ is invariant under a unitary transformation if and only if ρ is a rank one projection.

Suppose first that ρ is a rank one projection. Then ρ is invariant under a unitary transformation if and only if ρ is a rank one projection.

Conversely, suppose that ρ is invariant under a unitary transformation. Then ρ is a rank one projection.

Proof of Lemma 2. Let ρ be a pure state. We show that ρ is invariant under a unitary transformation if and only if ρ is a rank one projection.

Suppose first that ρ is a rank one projection. Then ρ is invariant under a unitary transformation if and only if ρ is a rank one projection.

Conversely, suppose that ρ is invariant under a unitary transformation. Then ρ is a rank one projection.

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Moreover, from $\phi(p_n) = \phi(p_{n-1})$, it follows that $\forall n \in \mathbb{N}$, $n \geq 1$,

$$\phi(p_n) > \phi(p_{n-1}) > 0,$$

(8)

$$\phi(p_{n+1}) \geq \phi(p_n),$$

(9)

which is not a contradiction to (7).

Consequently, the sequence $\{\phi(p_n)\}_{n \in \mathbb{N}}$ would have some application towards

Lemma 4. Suppose ϕ is a function from $\mathbb{N}$ to $\mathbb{N}$, $\phi(1) = 1$.

(10)

Let every integer $n \in \mathbb{N}$ be assigned among the

Let ϕ denote the set of integers $n \in \mathbb{N}$ with the property that $\phi(n) \geq 1$.

Then the set ϕ is a subset of $\mathbb{N}$ and ϕ is a complete sequence.

Proof. Let ϕ be a complete sequence. Then $\phi(1) = 1$ and $\phi(2) = 1$. Let $\phi(3) = 1$.

Consequently, the sequence ϕ is a complete sequence.

Let $\phi(4) = 1$.

(11)

Then $\phi(5) = 1$.

Let $\phi(6) = 1$.

$$s_m \leq s_{n-1} \quad (12)$$

$$s_m \leq s_{n-1}$$

$$s_m \leq s_{n-1}$$

$$s_m \leq s_{n-1}$$

$$s_m \leq s_{n-1}$$

Let $n \in \mathbb{N}$, $n \geq 1$. Then $\phi(n) = 1$ for all $n \in \mathbb{N}$.

Let $\phi(n) = 1$ for all $n \in \mathbb{N}$.

Let $\phi(n) = 1$ for all $n \in \mathbb{N}$. Then $\phi(n) = 1$ for all $n \in \mathbb{N}$.

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We show that the sequence of primes is ϕ -complete. However, a

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Let $\phi(n) = 1$ for all $n \in \mathbb{N}$.

answer is found in the following:

Corollary. Every $n \in \mathbb{N}$ is the sum of at least two distinct primes.

Proof. In light of Theorem 1, it is sufficient to prove that $\phi(p) \geq 2$ for all primes $p \geq 11$. We may assume $\phi(p) = 1$ in (3), assuming that $n \geq 1$. Then it follows that

in other words assume inductively that G_{i-1} induces a graph with vertex set V_{i-1} .

Let G_i be obtained from G_{i-1} by adding the edges E_i .

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We first note that

is the number of vertices in G_i and n_i is the number of edges in G_i .

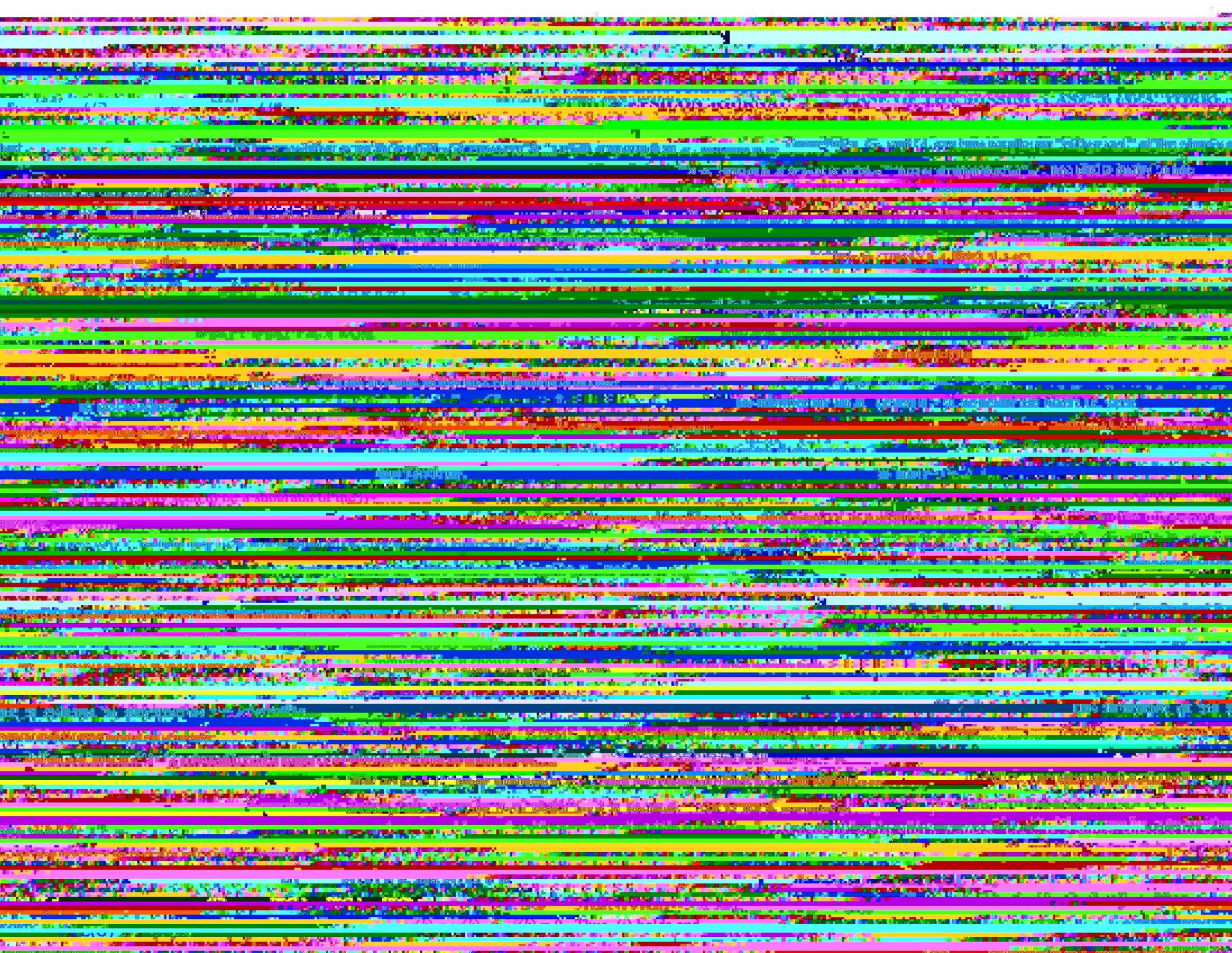
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Let G_i be obtained from G_{i-1} by adding the edges E_i .



$$w(\varphi_j(r - (r - 1)_{x-1})) =$$

Let $x = 1$. Then $\varphi_j(r - (r - 1)_{x-1}) = \varphi_j(r)$ and $w(\varphi_j(r)) = w(r) = 1$ for all $j \in \{0, 1, \dots, s-1\}$. Thus, $w(\varphi_j(r - (r - 1)_{x-1})) = 1$ for all $j \in \{0, 1, \dots, s-1\}$.

Let $x > 1$. Then $\varphi_j(r - (r - 1)_{x-1}) = \varphi_j(r - (r - 1)_{x-1})$ and $w(\varphi_j(r - (r - 1)_{x-1})) = w(r - (r - 1)_{x-1}) = 1$ for all $j \in \{0, 1, \dots, s-1\}$. Thus, $w(\varphi_j(r - (r - 1)_{x-1})) = 1$ for all $j \in \{0, 1, \dots, s-1\}$.

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We now define ϕ_s as follows: For $k \in \{0, 1, \dots, s-1\}$,
 $\phi_s(k) = 1$ if $k = 0$ and $\phi_s(k) = 0$ otherwise.

Case C

Let $s < r$, then the two sets $\{0, 1, \dots, s-1\}$ and $\{s, s+1, \dots, r-1\}$ are disjoint. We will consider them separately in the following lemma.

$$\varphi_j(r - (r - 1)_{x-1}) = \varphi_j(r - (r - 1)_{x-1}) = 1 \text{ for } j \in \{0, 1, \dots, s-1\},$$

$$\varphi_j(r - (r - 1)_{x-1}) = \varphi_j(r - (r - 1)_{x-1}) = 0 \text{ for } j \in \{s, s+1, \dots, r-1\}.$$

Let $j \in \{0, 1, \dots, s-1\}$. Then $\varphi_j(r - (r - 1)_{x-1}) = 1$ for all $j \in \{0, 1, \dots, s-1\}$. Thus, $w(\varphi_j(r - (r - 1)_{x-1})) = 1$ for all $j \in \{0, 1, \dots, s-1\}$.

Let $j \in \{s, s+1, \dots, r-1\}$. Then $\varphi_j(r - (r - 1)_{x-1}) = 0$ for all $j \in \{s, s+1, \dots, r-1\}$. Thus, $w(\varphi_j(r - (r - 1)_{x-1})) = 0$ for all $j \in \{s, s+1, \dots, r-1\}$.

(2)

Let ϕ_s be the function defined by $\phi_s(k) = 1$ if $k = 0$ and $\phi_s(k) = 0$ otherwise. Then ϕ_s is a function from $\{0, 1, \dots, s-1\}$ to $\{0, 1\}$. Hence, (1) and (ii) holds vacuously since $s < r$.

$$w(\varphi_j(r - (r - 1)_{x-1})) = w(r - (r - 1)_{x-1}) = 1 \text{ for } j \in \{0, 1, \dots, s-1\},$$

Let $j \in \{s, s+1, \dots, r-1\}$.

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Let $j \in \{s, s+1, \dots, r-1\}$.



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this area means that the *Antarctic Peninsula* is a *mountain range*

Antarctic Peninsula is a *mountain range*

divisibility set (or digit weights) for a given divisor n is a set of digit weights

such that, in any representation of a number, a repetition of a digit weight must have appeared a second time. As soon as a digit

A divi

divisibility set for a given divisor n , the first digit weight is always $b_0 = 1 = 10^0$

weights of the set $\{b_0, b_1, \dots, b_{k-1}\}$

where the weights $b_i = 10^{a_i}$ for $i = 0, 1, \dots, k-1$ are the weights of the set $\{b_0, b_1, \dots, b_{k-1}\}$

To check whether 65 221 806 is divisible by 7 and to find the remainder if

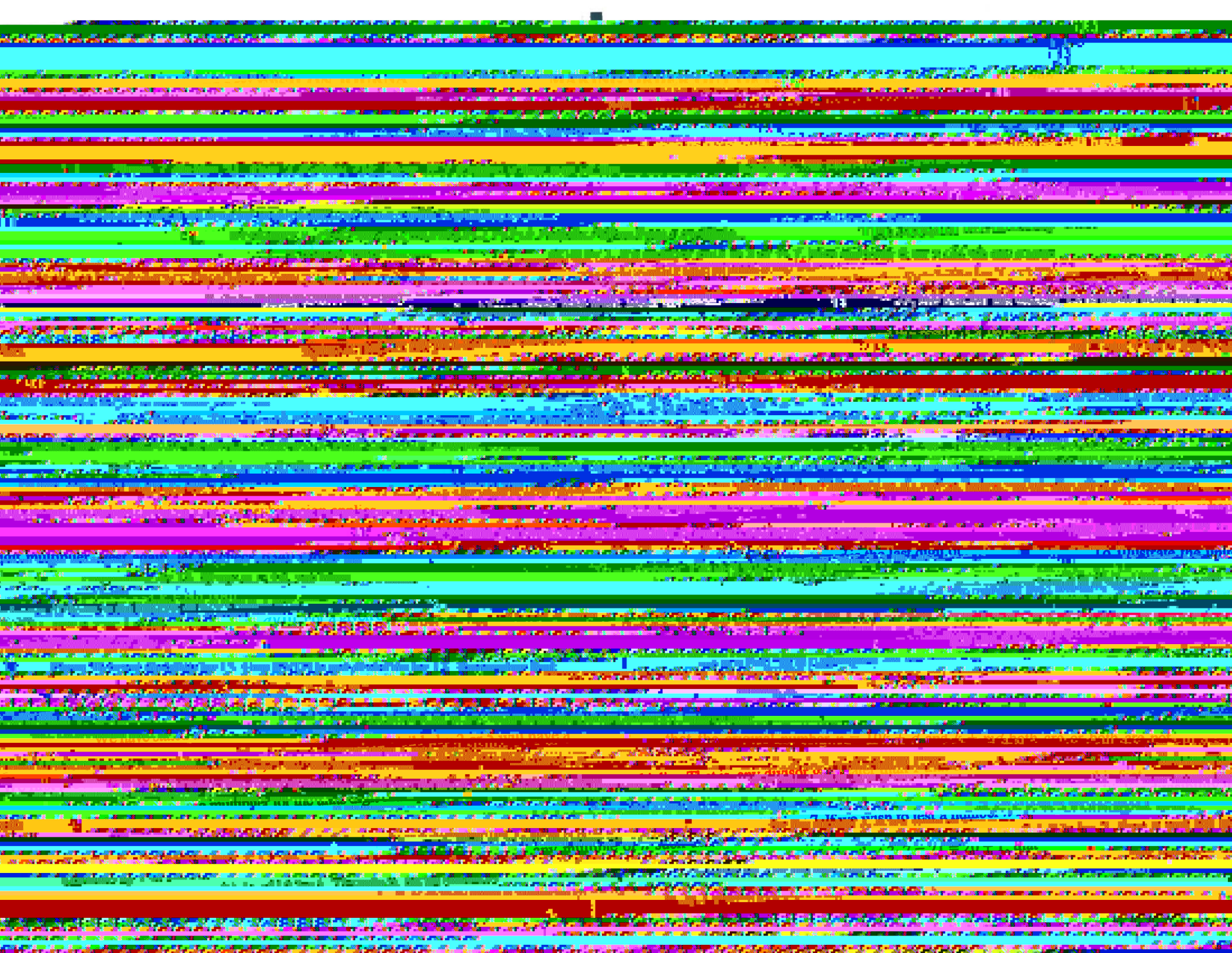


Table 2. Values of m , the Units Digit Multiplier

[illegible]

MAKING ORDER OUT OF CHAOS: DODGE

Conclusion

Constraints: $\sum_{i=1}^n x_i = 1$ and $x_i \geq 0$ for all i .

[illegible]

The figure consists of two rows of eight grayscale images each, showing a handwritten digit '4'. The top row shows a progression from a clear, sharp digit to a heavily blurred and noisy version. The bottom row shows a progression from a clear, sharp digit to a heavily distorted and pixelated version.

rolling in 3 hours by 3 each time, then rolling in 7 days in 3 rolls over to extend the life as far as one might wish.

The first column shows the number of observations per country.

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Abstract

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1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812

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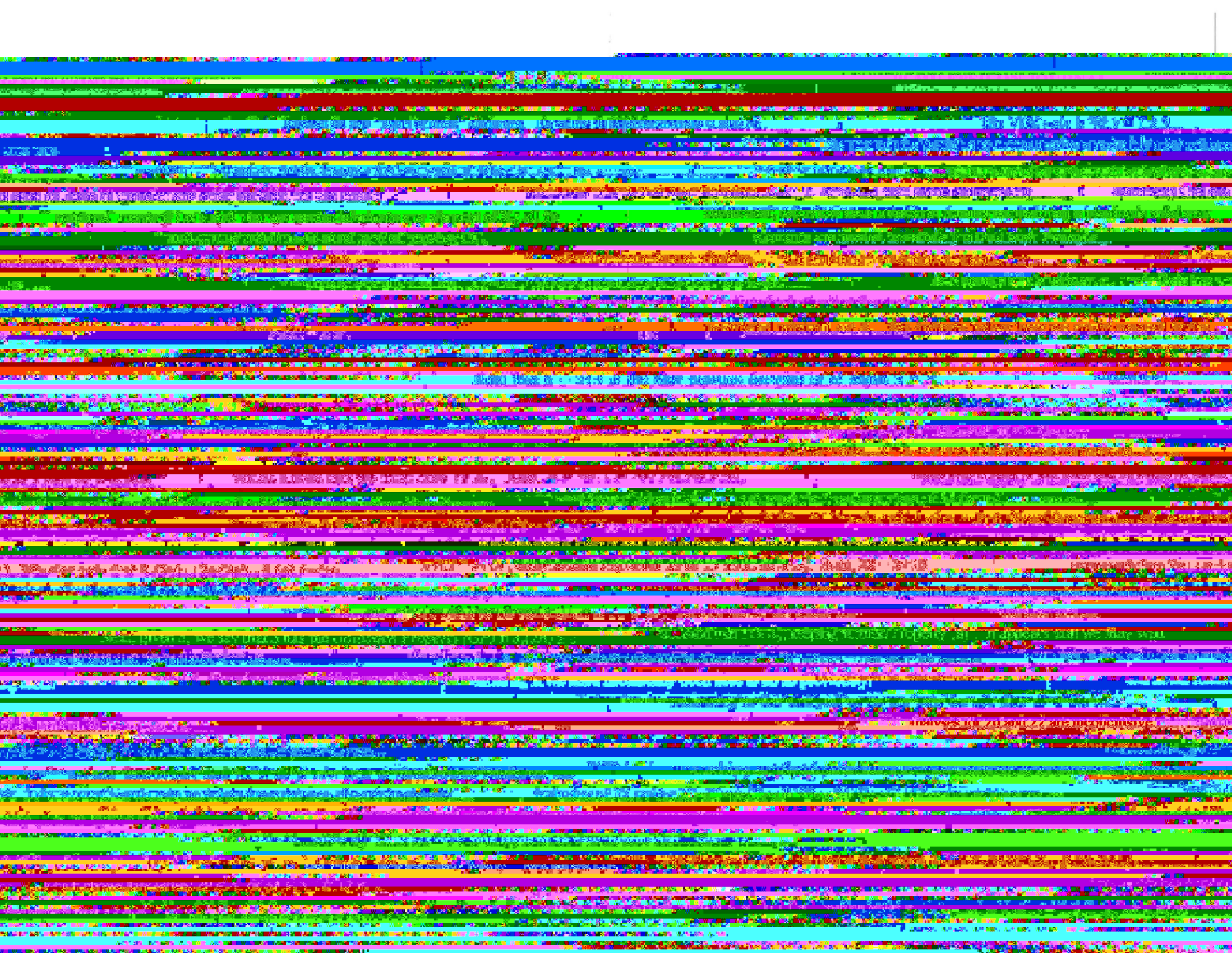
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responsible for the new national strategy. On the other hand, it

Abstract

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and the hypothesis is true for all $n \leq p-1$, where we have already assumed

that if H_1 we cannot establish this as a result of the truth of H_2 . We may

be satisfied as a statement of the form $n = 2k$, n being the number of

elements of H_1 . In this case, we have at the beginning of the sequence

of the hypothesis and H_2 :

H_1 and H_2 of $n, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 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2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 216$

Determinants of Δ_m -Matrices Using The Method of

1. Δ_m -Matrices

are quite common in queueing theory problems and problems on the control of resources. Because these matrices come up so commonly in these topics, it

we find the determinants of some special forms of Δ_m -matrices using generating functions. For further analysis of Δ_m - and more general $\Delta_{m,n}$ -matrices, the reader

2.1 Determinants of Δ_m -Toeplitz Matrices

we now consider the determinants of two different forms of Δ_m -Toeplitz matrices.

1. Let A be an $n \times n$ Toeplitz matrix of the following form:

Definition 2.1 We shall refer to a block matrix $A^k = (a_{ij}^k)$ whose entries are blocks of size $m \times m$ as a Δ_m -matrix if $a_{ij}^k = 0$ for $i - j \geq k$ or for $i - j < -k$. This matrix has the following form:

$$M = \begin{pmatrix} a_1 & a_2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & a_2 & a_3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & a_3 & a_4 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & a_4 & a_5 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_5 & a_6 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_6 & a_7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_7 & a_8 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_8 & a_9 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_9 & a_{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & a_{10} \end{pmatrix} \quad (2)$$

$$M = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$M(x) = a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4 + a_5 x^5 + a_6 x^6 + a_7 x^7 + a_8 x^8 + a_9 x^9 + a_{10} x^{10}$$

$$M(x) = a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4 + a_5 x^5 + a_6 x^6 + a_7 x^7 + a_8 x^8 + a_9 x^9 + a_{10} x^{10}$$

$$M(x) = a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4 + a_5 x^5 + a_6 x^6 + a_7 x^7 + a_8 x^8 + a_9 x^9 + a_{10} x^{10}$$

determinant of M by expanding the determinant along the last column of M . We will then solve this recurrence relation using generating functions.

Let D_n be the determinant of M . When we delete the last row and last column then the resulting $(n-1) \times (n-1)$ matrix is

$$M(x) = \frac{1}{x} (a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4 + a_5 x^5 + a_6 x^6 + a_7 x^7 + a_8 x^8 + a_9 x^9 + a_{10} x^{10})$$

region. We observe that the a_{10} which is a coefficient in the above row and second column. At first we are left with a matrix that is in the above row and second column. We observe that the a_{10} which is a coefficient in the above row and second column.

solution. This last relation becomes as with $n = 2$.

Then we observe that the a_{10} which is a coefficient in the above row and second column.

In the following recurrence relation,

$$D_n = a_1 D_{n-1} + a_2 D_{n-2} + \dots + a_{10} D_{n-10}$$

while

$$D_1 = 1, D_2 = a_1$$

The solution to this recurrence is generating function. Once this solution is found, we will have a closed formula.

$$D(x) = \frac{1}{1 - a_1 x + a_2 x^2 - a_3 x^3 + a_4 x^4 - a_5 x^5 + a_6 x^6 - a_7 x^7 + a_8 x^8 - a_9 x^9 + a_{10} x^{10}}$$

where

$$a_1 = \sqrt{a_1^2 - 4a_2 a_3}, a_2 = \sqrt{a_1^2 - 4a_2 a_3}, a_3 = \sqrt{a_1^2 - 4a_2 a_3}, a_4 = \sqrt{a_1^2 - 4a_2 a_3}, a_5 = \sqrt{a_1^2 - 4a_2 a_3}, a_6 = \sqrt{a_1^2 - 4a_2 a_3}, a_7 = \sqrt{a_1^2 - 4a_2 a_3}, a_8 = \sqrt{a_1^2 - 4a_2 a_3}, a_9 = \sqrt{a_1^2 - 4a_2 a_3}, a_{10} = \sqrt{a_1^2 - 4a_2 a_3}$$

for the determinant of the matrix $M(x)$, then

$$D(x) = \sum_{n=0}^{\infty} D_n x^n = \sum_{n=0}^{\infty} a_1 x^n + \sum_{n=0}^{\infty} a_2 x^{2n} + \sum_{n=0}^{\infty} a_3 x^{3n} + \sum_{n=0}^{\infty} a_4 x^{4n} + \sum_{n=0}^{\infty} a_5 x^{5n} + \sum_{n=0}^{\infty} a_6 x^{6n} + \sum_{n=0}^{\infty} a_7 x^{7n} + \sum_{n=0}^{\infty} a_8 x^{8n} + \sum_{n=0}^{\infty} a_9 x^{9n} + \sum_{n=0}^{\infty} a_{10} x^{10n}$$

[Download the 1000 Most Common Words in English](#)
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Bellevue Park and Brewery Coffer (containing)
Eleven of the North Platte

[illegible]

However, they are further divided into two categories: *de jure* and *de facto* states. <http://www.britannica.com>

3.1. **Универсальное решение задачи о минимизации**
 функции $f(x)$ на множестве S .

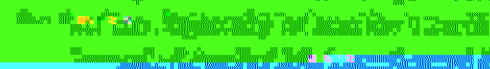
Abstract The purpose of this study was to determine the effect of a 12-week training program on the heart rate (HR) and heart rate reserve (HRR) of sedentary middle-aged men. The subjects were divided into two groups: a control group and an exercise group. The control group performed no exercise, while the exercise group performed a 12-week training program. The HR and HRR were measured at rest and during exercise. The results showed that the exercise group had a significantly higher HR and HRR than the control group at rest and during exercise. The findings suggest that a 12-week training program can improve the cardiovascular fitness of sedentary middle-aged men.

Case of 1 female

$$\frac{d}{dt} \left(\frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}$$

Source: <http://www.fishbase.org>. Accessed 12/10/2010.

* **Abstracts** 1.11 and 2.12 **Reproductive** **Abstracts**



2000-2001, 2001-2002, 2002-2003
 2003-2004, 2004-2005, 2005-2006

Application: *Journal of Management Education*, Vol. 4, December 1979

[illegible]

Therefore

$$c = x+y = \sqrt{a^2 - (ab/c)^2} + \sqrt{b^2 - (ab/c)^2},$$

Pythagorean Theorem

Tammy Muhs (student)

back to
back.

Now we simplify the above identity.

Verify the following identity

1. area (triangle) + area (triangle)

$$\frac{1}{2}ab + \frac{1}{2}bc = \frac{1}{2}ac$$

$$ab + bc = ac$$

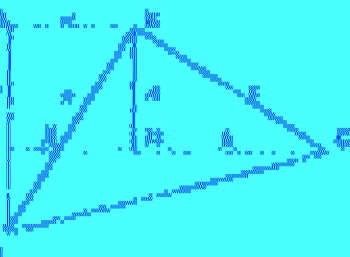


Figure 1

area

$$\frac{1}{2}ab + \frac{1}{2}bc = \frac{1}{2}ac$$

$$\begin{aligned} ab + bc &= ac \\ ab^2 + bc^2 &= ac^2 \\ ab^2 + bc^2 &= a^2c + b^2c + c^2c \\ ab^2 + bc^2 &= a^2c + b^2c + c^3 \\ ab^2 + bc^2 &= a^2c + b^2c + c^3 \end{aligned}$$

The proof is complete.

From the discussion above, we have proved the Pythagorean theorem.

Problem: Let a, b, c be the sides of a right triangle with hypotenuse c . Prove that $a^2 + b^2 = c^2$. (Hint: Use the Pythagorean theorem.)

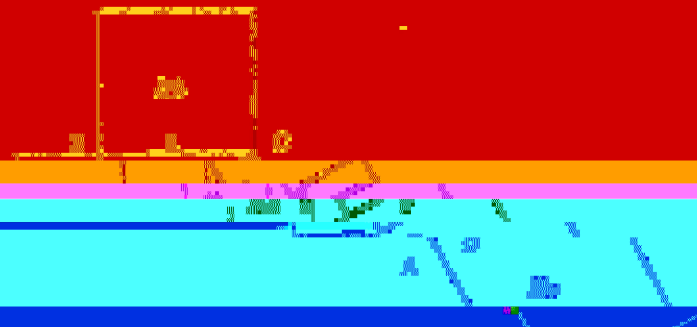
$$a^2 + b^2 = c^2$$

References

1. Michael L. J. Smith, *The Pythagorean Proposition*, Birkbeck, 1998.
2. Michael C. Wheeler and Stephen P. West, *Math in Geometry*, second edition, Cambridge University Press, 1998.

Proof 2

Draw the squares externally on the sides of $\triangle ABC$. For convenience, let the sides AB , BC and AC have lengths a , b and c respectively. Then the squares constructed on the sides of $\triangle ABC$ have side lengths a , b and c respectively. Therefore



The squares constructed on the sides of $\triangle ABC$ have side lengths a , b and c respectively. Therefore

$$a^2 = AB^2 + AC^2 \\ b^2 = BC^2 + AC^2$$

Since

$$a^2 = AB^2 + AC^2 \\ b^2 = BC^2 + AC^2$$

$$a^2 - b^2 = AB^2 - BC^2$$

$$a^2 = AB^2 + AC^2$$

$$b^2 = BC^2 + AC^2$$

$$a^2 - b^2 = AB^2 - BC^2$$

$$a^2 - b^2 = AB^2 - BC^2$$

Therefore the squares constructed on the sides of $\triangle ABC$ have equal areas.

$$a^2 = AB^2 + AC^2$$

$$b^2 = BC^2 + AC^2$$

$$a^2 - b^2 = AB^2 - BC^2$$

$$a^2 - b^2 = AB^2 - BC^2$$



[illegible]

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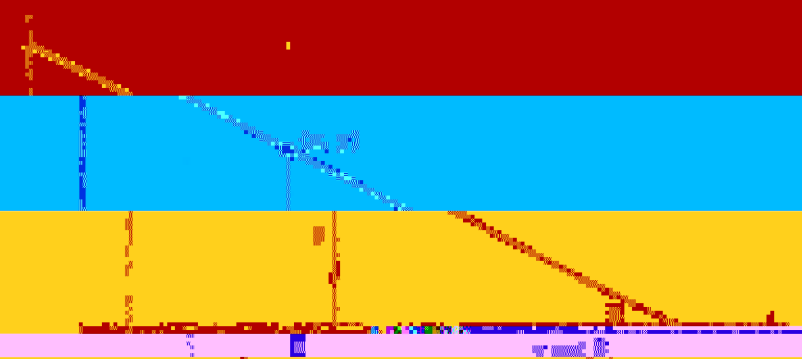
• **Prevalence** = the proportion of a population that has a disease at a particular point in time

2017年10月10日 星期三

The μ -value for $\mathcal{L}_{\text{top}}$ indicates that the C_{60} molecule has a high weight in

Figure 1

version: 0.0.1, 0.0.2, 0.0.3, 0.0.4, 0.0.5, 0.0.6, 0.0.7, 0.0.8, 0.0.9, 0.0.10, 0.0.11, 0.0.12, 0.0.13, 0.0.14, 0.0.15, 0.0.16, 0.0.17, 0.0.18, 0.0.19, 0.0.20, 0.0.21, 0.0.22, 0.0.23, 0.0.24, 0.0.25, 0.0.26, 0.0.27, 0.0.28, 0.0.29, 0.0.30, 0.0.31, 0.0.32, 0.0.33, 0.0.34, 0.0.35, 0.0.36, 0.0.37, 0.0.38, 0.0.39, 0.0.40, 0.0.41, 0.0.42, 0.0.43, 0.0.44, 0.0.45, 0.0.46, 0.0.47, 0.0.48, 0.0.49, 0.0.50, 0.0.51, 0.0.52, 0.0.53, 0.0.54, 0.0.55, 0.0.56, 0.0.57, 0.0.58, 0.0.59, 0.0.60, 0.0.61, 0.0.62, 0.0.63, 0.0.64, 0.0.65, 0.0.66, 0.0.67, 0.0.68, 0.0.69, 0.0.70, 0.0.71, 0.0.72, 0.0.73, 0.0.74, 0.0.75, 0.0.76, 0.0.77, 0.0.78, 0.0.79, 0.0.80, 0.0.81, 0.0.82, 0.0.83, 0.0.84, 0.0.85, 0.0.86, 0.0.87, 0.0.88, 0.0.89, 0.0.90, 0.0.91, 0.0.92, 0.0.93, 0.0.94, 0.0.95, 0.0.96, 0.0.97, 0.0.98, 0.0.99, 0.0.100, 0.0.101, 0.0.102, 0.0.103, 0.0.104, 0.0.105, 0.0.106, 0.0.107, 0.0.108, 0.0.109, 0.0.110, 0.0.111, 0.0.112, 0.0.113, 0.0.114, 0.0.115, 0.0.116, 0.0.117, 0.0.118, 0.0.119, 0.0.120, 0.0.121, 0.0.122, 0.0.123, 0.0.124, 0.0.125, 0.0.126, 0.0.127, 0.0.128, 0.0.129, 0.0.130, 0.0.131, 0.0.132, 0.0.133, 0.0.134, 0.0.135, 0.0.136, 0.0.137, 0.0.138, 0.0.139, 0.0.140, 0.0.141, 0.0.142, 0.0.143, 0.0.144, 0.0.145, 0.0.146, 0.0.147, 0.0.148, 0.0.149, 0.0.150, 0.0.151, 0.0.152, 0.0.153, 0.0.154, 0.0.155, 0.0.156, 0.0.157, 0.0.158, 0.0.159, 0.0.160, 0.0.161, 0.0.162, 0.0.163, 0.0.164, 0.0.165, 0.0.166, 0.0.167, 0.0.168, 0.0.169, 0.0.170, 0.0.171, 0.0.172, 0.0.173, 0.0.174, 0.0.175, 0.0.176, 0.0.177, 0.0.178, 0.0.179, 0.0.180, 0.0.181, 0.0.182, 0.0.183, 0.0.184, 0.0.185, 0.0.186, 0.0.187, 0.0.188, 0.0.189, 0.0.190, 0.0.191, 0.0.192, 0.0.193, 0.0.194, 0.0.195, 0.0.196, 0.0.197, 0.0.198, 0.0.199, 0.0.200, 0.0.201, 0.0.202, 0.0.203, 0.0.204, 0.0.205, 0.0.206, 0.0.207, 0.0.208, 0.0.209, 0.0.210, 0.0.211, 0.0.212, 0.0.213, 0.0.214, 0.0.215, 0.0.216, 0.0.217, 0.0.218, 0.0.219, 0.0.220, 0.0.221, 0.0.222, 0.0.223, 0.0.224, 0.0.225, 0.0.226, 0.0.227, 0.0.228, 0.0.229, 0.0.230, 0.0.231, 0.0.232, 0.0.233, 0.0.234, 0.0.235, 0.0.236, 0.0.237, 0.0.238, 0.0.239, 0.0.240, 0.0.241, 0.0.242, 0.0.243, 0.0.244, 0.0.245, 0.0.246, 0.0.247, 0.0.248, 0.0.249, 0.0.250, 0.0.251, 0.0.252, 0.0.253, 0.0.254, 0.0.255, 0.0.256, 0.0.257, 0.0.258, 0.0.259, 0.0.260, 0.0.261, 0.0.262, 0.0.263, 0.0.264, 0.0.265, 0.0.266, 0.0.267, 0.0.268, 0.0.269, 0.0.270, 0.0.271, 0.0.272, 0.0.273, 0.0.274, 0.0.275, 0.0.276, 0.0.277, 0.0.278, 0.0.279, 0.0.280, 0.0.281, 0.0.282, 0.0.283, 0.0.284, 0.0.285, 0.0.286, 0.0.287, 0.0.288, 0.0.289, 0.0.290, 0.0.291, 0.0.292, 0.0.293, 0.0.294, 0.0.295, 0.0.296, 0.0.297, 0.0.298, 0.0.299, 0.0.300, 0.0.301, 0.0.302, 0.0.303, 0.0.304, 0.0.305, 0.0.306, 0.0.307, 0.0.308, 0.0.309, 0.0.310, 0.0.311, 0.0.312, 0.0.313, 0.0.314, 0.0.315, 0.0.316, 0.0.317, 0.0.318, 0.0.319, 0.0.320, 0.0.321, 0.0.322, 0.0.323, 0.0.324, 0.0.325, 0.0.326, 0.0.327, 0.0.328, 0.0.329, 0.0.330, 0.0.331, 0.0.332, 0.0.333, 0.0.334, 0.0.335, 0.0.336, 0.0.337, 0.0.338, 0.0.339, 0.0.340, 0.0.341, 0.0.342, 0.0.343, 0.0.344, 0.0.345, 0.0.346, 0.0.347, 0.0.348, 0.0.349, 0.0.350, 0.0.351, 0.0.352, 0.0.353, 0.0.354, 0.0.355, 0.0.356, 0.0.357, 0.0.358, 0.0.359, 0.0.360, 0.0.361, 0.0.362, 0.0.363, 0.0.364, 0.0.365, 0.0.366, 0.0.367, 0.0.368, 0.0.369, 0.0.370, 0.0.371, 0.0.372, 0.0.373, 0.0.374, 0.0.375, 0.0.376, 0.0.377, 0.0.378, 0.0.379, 0.0.380, 0.0.381, 0.0.382, 0.0.383, 0.0.384, 0.0.385, 0.0.386, 0.0.387, 0.0.388, 0.0.389, 0.0.390, 0.0.391, 0.0.392, 0.0.393, 0.0.394, 0.0.395, 0.0.396, 0.0.397, 0.0.398, 0.0.399, 0.0.400, 0.0.401, 0.0.402, 0.0.403, 0.0.404, 0.0.405, 0.0.406, 0.0.407, 0.0.408, 0.0.409, 0.0.410, 0.0.411, 0.0.412, 0.0.413, 0.0.414, 0.0.415, 0.0.416, 0.0.417, 0.0.418, 0.0.419, 0.0.420, 0.0.421, 0.0.422, 0.0.423, 0.0.424, 0.0.425, 0.0.426, 0.0.427, 0.0.428, 0.0.429, 0.0.430, 0.0.431, 0.0.432, 0.0.433, 0.0.434, 0.0.435, 0.0.436, 0.0.437, 0.0.438, 0.0.439, 0.0.440, 0.0.441, 0.0.442, 0.0.443, 0.0.444, 0.0.445, 0.0.446, 0.0.447, 0.0.448, 0.0.449, 0.0.450, 0.0.451, 0.0.452, 0.0.453, 0.0.454, 0.0.455, 0.0.456, 0.0.457, 0.0.458, 0.0.459, 0.0.460, 0.0.461, 0.0.462, 0.0.463, 0.0.464, 0.0.465, 0.0.466, 0.0.4



Corollary 3.1. If a and b are $\mathbb{R}$ -linearly independent, then

$$C \cap \text{shad}(C) = \emptyset \quad (\text{invariant under } \gamma \in \text{shad}(C)).$$

shadow cast by $C_{k+1} \times C_{k+1}$ is identical to the shadow cast

by $C_k \times C_k$. The proof starts with the same inductive argument, using

$C \times C$ as the starting point. Then use the finite intersection condition to

guarantee that an element of $C \times C$ will cast a shadow on any point in the shadow of $C_k \times C_k$. $\square$

Proof. Let $(c_1, c_2) \in C \cap \text{shad}(C)$. The shadow cast by (c_1, c_2) will

be $c_1 + c_2 \cot \theta$ for $C_k + (\cot \theta) C_k \subset I_k$. Thus $C_k + (\cot \theta) C_k \subset I_k$

both sides of this equation by b gives us $aC + bC$

and $aC + bC = I_k + bC$ which says that bC is both contained in I_k and $aC + bC$. This is impossible since aC and bC are linearly independent. $\square$

Second, consider points $(c_1, c_2) \in C \cap \text{shad}(C)$. The shadow cast by (c_1, c_2) will be $c_1 + c_2 \cot \theta$ for $C_k + (\cot \theta) C_k \subset I_k$. Thus $C_k + (\cot \theta) C_k \subset I_k$ both sides of this equation by b gives us $aC + bC$

and $aC + bC = I_k + bC$ which says that bC is both contained in I_k and $aC + bC$. This is impossible since aC and bC are linearly independent. $\square$

Theorem 3.4. Let L denote the Cantor shadow for the width 1 . Then

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Math. Ann. 199, 1953, 233-243.

$1 - \frac{1}{2} = \frac{1}{2}$ $\square$

Math. Ann. 199, 1953, 233-243.

$$I_k = \bigcup_{n=0}^{\infty} [a_n, b_n] + 10^n + \text{shad}(I_k).$$

a. $I_{k+1} = [a_{k+1}, b_{k+1}] + 10^{k+1} + \text{shad}(I_{k+1})$

b. The Cantor shadow of I_k is I_k .

Math. Ann. 199, 1953, 233-243.

Periodically, she would search the file of patients for a period followed by a

Xiaocong Ruan Es (presented)

Abstract. We show that there are infinitely many

From days later, I received an email message from Annie with the subject

The last two digits of 99999^2 are 9999. Anna's observation is

Then "Curious Numbers" and the definition of $CC(n) = 99999^2 - 99999^2$. Notice that

is not a curious number. We will see that $CC(n)$ is divisible by 100.

$5^2 = 99999$ has a unit followed by four zeros. Suppose 5^m has m zeros.

This paper is to answer the following two questions:

1. How many curious numbers are there?

2. Are there infinitely many curious numbers?

infinitely many curious numbers?

$2(2^n + n)!$ Observing that $56833^2 = 29155 = 2^4 \cdot 15$ and $97 = 17 = 2^4 \cdot 5$,

and then proceeding for the next sequence of numbers, we can see that

and hence we can see that 56833^2 is a curious number.

where 56833 is a base 5 number (many noted curious) by this unit sequence [1, 2].

Let 5^m be a base 5 number.

$$x = \frac{1 + \sqrt{1 + 4n}}{2} \cdot (n + 1) \cdot 2^m$$

and

$$y = (2^m + n^2 + 1) \cdot 2^{m+1}$$

$$y = (2^m + n^2 + 1) \cdot 2^{m+1}$$

know that n is a multiple of 10^m if x is an m -digit integer.

n^2 and $0 = 2^m + n^2 + n^2$ with $m = (n + 5)/2$.

The following theorem is useful for constructing curious numbers.

Since we have factored $f(n)$ for $n \geq 1$ and answered the question

the above two questions will now follow. First, let us show that

is not a curious number. Second, we will show that $f(n)$ is a

curious number. Third, we will show that $f(n)$ is a curious number

if and only if n is a curious number. Finally, we will show that

is not a curious number. This will complete the proof.

Theorem 1: If an m -digit number $A_{m-1}A_{m-2}\dots A_0$ is a curious number, so is the

5^m -digit number $A_{m-1}A_{m-2}\dots A_05^m$.

$$\text{Proof: Since } A_{m-1}A_{m-2}\dots A_0 = 10^m A_{m-1} + A_{m-2}\dots A_0,$$

$$= 10^m A_{m-1} + A_{m-2}\dots A_0$$

$A_{m-1}A_{m-2}\dots A_0$. By examining the last equation, we verify directly that that

exists in the last $m - 1$ digits of $A_{m-1}A_{m-2}\dots A_05^m$. Thus, the

the last $m - 1$ digits of $A_{m-1}A_{m-2}\dots A_0$ are also $A_{m-1}A_{m-2}\dots A_0$. By definition,

$A_{m-1}A_{m-2}\dots A_0$ is a curious number. $\square$

This result provides an easy way of finding curious numbers.

among the newly formed number and see if this number repeats itself in the new array. The reason that when this method is used results in a beautiful table. The

curious numbers are 04, 24, 36, 46, 56, 66, 76, 86 and 96 in sequence. Thus

$$\begin{aligned} 04^2 &= 016 \\ 14^2 &= 196 \\ 24^2 &= 476 \\ 34^2 &= 1156 \\ 44^2 &= 1536 \\ 54^2 &= 2916 \\ 64^2 &= 4116 \\ 74^2 &= 5476 \\ 84^2 &= 7056 \\ 94^2 &= 8836 \end{aligned}$$

and

so we see that number 76 is another curious number. We are now using the square root of the number 76, 86, 96, 06, 16, 26, 36, 46, 56, 66, 76, 86 and 96. Then

$$\begin{aligned} 06^2 &= 36 \\ 16^2 &= 256 \\ 26^2 &= 676 \\ 36^2 &= 1296 \\ 46^2 &= 2116 \\ 56^2 &= 3136 \end{aligned}$$

$$66^2 = 4356$$

$$\begin{aligned} 76^2 &= 5776 \\ 86^2 &= 7396 \\ 96^2 &= 9216 \end{aligned}$$

and

Now we see that number 96 is another curious number.

the number array. Suppose x is an n -digit curious number. By definition

$$x^2 = a_1a_2 \dots a_n a_{n+1} a_{n+2} \dots a_{2n}$$

$$\frac{x^2}{10^n} = \frac{x(x-1)}{2 \cdot 10^n}$$

so we suppose. Suppose x and $x-1$ are relatively prime,

$$\text{Q.E.D. 3. } x \text{ satisfies } x^2 \text{ the factors of } 2 \text{ and } x-1 \text{ and}$$

$$x^2 = 2^n \cdot p$$

$$x = 2^m \cdot q \text{ of } 04, 24, 36, 46$$

Therefore,

$$2^n \cdot p = 10^n \cdot 2^m \cdot q^2$$

then the number x is a curious number.

$$x = 2^m \cdot q$$

$$x^2 = 2^{2m} \cdot q^2$$

Therefore,

$$2^{2m} \cdot q^2 = 2^n \cdot p$$

so we suppose x is a curious number.

Let $x = 2^m \cdot q$, then

where x is a curious number.

Therefore, x is a curious number.

and

and

Then

$$y = 2^{2^{n-1}-1} (\text{mod } 2^n)$$

$$= 2^{2^{n-1}-1} (\text{mod } 2^n)$$

$$= 2^{2^{n-1}-1} (\text{mod } 2^n)$$

and

$$y^{2^{n-1}} = 1 (\text{mod } 2^n)$$

and

$$y^{2^{n-1}} = 1 (\text{mod } 2^n)$$

Then

$$y = 2^{2^{n-1}-1} (\text{mod } 2^n)$$

Case 2.

$$y = 2^{2^{n-1}-1} (\text{mod } 2^n) = 2^{2^{n-1}-1} \left(\frac{2^{2^{n-1}}}{2^n} \right)$$

$$y = 2^{2^{n-1}-1} (\text{mod } 2^n) \quad \text{for } n \geq 2 \text{ (see 2)}$$

Now we have considered four cases and derived two formulae. Here we

$$= 2^{2^{n-1}-1} (\text{mod } 2^n)$$

we have derived a formula for numbers $n \geq 2$. It is obvious that there is an infinite number of numbers n for which the formula holds.

Conclusion

1. The numbers $2^{2^{n-1}-1}$ and $2^{2^{n-1}-1}$ are the only numbers y for which the formula holds.

$$y = 2^{2^{n-1}-1} (\text{mod } 2^n) \quad \text{for } n \geq 2$$

$$y = 2^{2^{n-1}-1} (\text{mod } 2^n) \quad \text{for } n \geq 2$$

2. There are infinitely many numbers n for which the formula holds.

For the case $n = 1$, the formula holds for the numbers $2^{2^{n-1}-1}$ and $2^{2^{n-1}-1}$ modulo 2^n .

References

1. Filipponi, P., A Curious Property of the Golden Section. Int. J. Math. Educ.

Case 1.

$$y = 2^{2^{n-1}-1} (\text{mod } 2^n) = 2^{2^{n-1}-1} \left(\frac{2^{2^{n-1}}}{2^n} \right)$$



attend graduate school. Presently, his mathematical interests include number theory, combinatorics, differential equations and optimization problems. In his

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single papers, manuscripts, letters, notes, books, etc., which are submitted.

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Figure 6

44

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As a result, the *Journal of Management Education* is pleased to announce that the 2011 *Journal of Management Education* will be published in 12 issues, with the first issue appearing in January 2011.

Abstract

▲ 2017 年 12 月 1 日

For detailed information on the program, visit www.rockwell.com



**Executive Director: Elizabeth
Tanner Patton**

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Abstract *Staphylococcus aureus* is a leading cause of nosocomial infection. The purpose of this study was to determine the prevalence of *S. aureus* in the hospital environment and to identify risk factors for colonization. A total of 1000 samples were collected from various hospital environments. The results showed that the prevalence of *S. aureus* was 15%. Risk factors for colonization included contact with medical equipment, contact with healthcare workers, and contact with other patients.

Abstract


 NATIONAL BUREAU OF ECONOMIC RESEARCH
 79 JOURNAL OF POLITICAL ECONOMY, Vol. 111, No. 1, February 2003

Let's begin, Am I not?

Dmitry M. Yudin

Washington and Lee University

Washington, D.C.

02000

Dmitry M. Yudin, Washington and Lee University, Washington, D.C.

Dmitry M. Yudin, Washington and Lee University, Washington, D.C.

and the first prize of a hundred dollars and two passes to the
each were awarded. The winning speakers were:

Stephen J. Yudin, St. Joseph's University,
Algorithm for Computing Geometric Functions

Stephen J. Yudin, St. Joseph's University,
Mathematics, Chemistry and Earth Sciences

Stephen J. Yudin, St. Joseph's University,
Mathematics, Chemistry and Earth Sciences

Stephen J. Yudin, St. Joseph's University,
Mathematics, Chemistry and Earth Sciences

Stephen J. Yudin, St. Joseph's University,
Mathematics, Chemistry and Earth Sciences

Stephen J. Yudin, St. Joseph's University,
Mathematics, Chemistry and Earth Sciences

Stephen J. Yudin, St. Joseph's University,
Mathematics, Chemistry and Earth Sciences

Stephen J. Yudin, St. Joseph's University,
Mathematics, Chemistry and Earth Sciences

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961. Proposed by Charles Ashbacher, Charles Ashbacher Technologies, Hiawatha, Iowa.

Given any positive integer n , the value of the Pseudo-Smarandache function $Z(n)$ is the smallest positive integer m such that n exactly divides

$$1 + 2 + 3 + \dots + m = \frac{m(m+1)}{2}.$$

Thus $Z(1) = 1$, $Z(2) = 3$, $Z(3) = 3$, $Z(4) = 7$, etc.

a) Prove there is an infinite family of integers n such that $Z(n) = n$.

b) Prove that there can be infinite number of such n . c) Prove that $\lim_{n \rightarrow \infty} Z(n) = \infty$.

962. Proposed by Richard I. Stein, Rancho Palos Verdes, California.

Sharon starts. You are given a shoelace, some matches, and a pile of stones. The shoelace forms 100×100 when it is closed and tied at both ends.

Sharon puts 100 stones at the corners of the shoelace and at the midpoints of each side.

Sharon then puts 100 matches at the corners of the shoelace and at the midpoints of each side.

Sharon then puts 100 stones at the corners of the shoelace and at the midpoints of each side.

Sharon then puts 100 matches at the corners of the shoelace and at the midpoints of each side.

a) What is the shortest time interval you can measure?

b) What is the shortest time interval you can measure if you have two such stones that are identical?

c) Suppose now that the two stones are not identical. How can you measure the time interval between the two stones?



Position 100

963. Proposed by Peter J. Schramm, Berkeley, California; Richard I. Stein, Rancho Palos Verdes, California.

Consider the function

$$f(n) = \frac{1}{n} \sum_{d|n} \phi(d) \cdot d.$$

964. Proposed by Ice B. Risteski, Skopje, Macedonia.

There are n_k balls of color k for $k = 1, 2, \dots, r$. The total number of balls

is $n_1 + n_2 + \dots + n_r = 2m$, where m is a positive integer.

a) In how many ways can these balls be separated into two groups of size m ?

b) In how many ways can these balls be separated into two groups of size m ?

965. Proposed by David Joy, Apollonia, Greece.

Consider the function

$$f(n) = \frac{1}{n} \sum_{d|n} \phi(d) \cdot d.$$

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Consider the function

$$f(n) = \frac{1}{n} \sum_{d|n} \phi(d) \cdot d.$$



William J. Williams

the lamp was initially off or on.

Example

Example

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if the lamp was initially off or on.

that the presentation group generated by (123) and (123)(345) contains all of the following terms (isomorphic to $3^2 \cdot 2^2 \cdot 5^2$): 3^2 (type 1), 2^2 (type 2), 5^2 (type 3) and (123)(345) is of type 3'.

$$\text{Let } x_j$$

$x_j = \max(x_j)$ for $j = 1, 2, \dots, n$. If $x = (x_1, x_2, \dots, x_n)$ is the

Let $x = (x_1, x_2, \dots, x_n)$ be a vector in the simplex S_n .

Let $x = (x_1, x_2, \dots, x_n)$ and $y = (y_1, y_2, \dots, y_n)$ be two vectors in the simplex S_n .

Let $x = (x_1, x_2, \dots, x_n)$ and $y = (y_1, y_2, \dots, y_n)$ be two vectors in the simplex S_n .

More generally, let $p = \min(x_i)$ and

Let $x = (x_1, x_2, \dots, x_n)$ and $y = (y_1, y_2, \dots, y_n)$ be two vectors in the simplex S_n .

(type 1): $(123)(345) = (123)(345)$,

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(type 3'): $(123)(345) = (123)(345)$, and

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Let $x = (x_1, x_2, \dots, x_n)$ and $y = (y_1, y_2, \dots, y_n)$ be two vectors in the simplex S_n .

201. [B2] (March 1993) Proposed by Murray S. Klamkin, University of Alberta, Edmonton, Alberta, Canada.

Let $x_1, x_2, \dots, x_n$ be positive real numbers such that

where p

$$x_1, x_2, \dots, x_n \text{ are positive real numbers such that}$$

Let $x_1, x_2, \dots, x_n$ be positive real numbers such that

$$x_1, x_2, \dots, x_n \text{ are positive real numbers such that}$$

and hence

$$x_1, x_2, \dots, x_n \text{ are positive real numbers such that}$$

where the x_i are all are positive and

Let $x_1, x_2, \dots, x_n$ be positive real numbers such that

$$x_1, x_2, \dots, x_n \text{ are positive real numbers such that}$$

$$x_1, x_2, \dots, x_n \text{ are positive real numbers such that}$$

Let $x_1, x_2, \dots, x_n$ be positive real numbers such that

We assume that the limit is to allow the x_i 's to vary, while at

any particular time, x_i is fixed.

Let $x_1, x_2, \dots, x_n$ be positive real numbers such that

2) For $0 < p < n \leq 1$, show a maximum exists for $x_1, x_2, \dots, x_n$

Let $x_1, x_2, \dots, x_n$ be positive real numbers such that

numbers. Estimate the constant value of $x_1, x_2, \dots, x_n$.

23) Suppose that $x_1, x_2, \dots, x_n$ are positive real numbers such that

Then

$$x_1, x_2, \dots, x_n \text{ are positive real numbers such that}$$

Let $x_1, x_2, \dots, x_n$ be positive real numbers such that

$$x_1, x_2, \dots, x_n \text{ are positive real numbers such that}$$

934. [Spring 1998] Proposed by Murray S. Klamkin, University of

Finally, letting $z = \pi^2 x - 1/x$, we obtain

$$\int_0^{\pi^2} \sin \pi x^2 dx = \int_0^{\pi^2} \cos \pi x^2 dx = \sqrt{\frac{2}{\pi}}$$

$$\begin{aligned} I &= 2 \int_0^{\pi^2} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) dx \\ &= 2 \left[\int_0^{\pi^2} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) dx + \int_{\pi^2}^{\infty} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) dx \right] \end{aligned}$$

$$\begin{aligned} \int_0^{\pi^2} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) dx &= \int_0^{\pi^2} \sin \left(\frac{1}{x^2} + \pi^2 x^2 \right) \left(\frac{-1}{x^3 x^2} \right) dx \\ &= \int_{\pi^2}^{\infty} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) \left(\frac{1}{x^3 x^2} \right) dx \end{aligned}$$

$$\begin{aligned} I &= 2 \int_0^{\pi^2} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) \left(1 + \frac{1}{x^2 x^2} \right) dx \\ &= 2 \int_0^{\pi^2} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) + 2x^2 \left(1 + \frac{1}{x^2 x^2} \right) dx \end{aligned}$$

$$\begin{aligned} &= 2 \left[\frac{1}{\pi} \cos \left(\pi^2 x^2 + \frac{1}{x^2} \right) \right]_0^{\pi^2} + 2 \left[\frac{1}{\pi} \cos \left(\pi^2 x^2 + \frac{1}{x^2} \right) \right]_0^{\pi^2} \\ &= \frac{2}{\pi} \cos \left(\pi^2 x^2 + \frac{1}{x^2} \right) \Big|_0^{\pi^2} \end{aligned}$$

It is interesting to note that a slight change in the problem gives the interesting conclusion

$$\int_0^{\pi^2} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) dx = \frac{3}{\sqrt{2\pi}}$$

which shows "up" the "interesting" result" of the problem. (The problem is a variation of the problem in the previous issue.)

The problem is a variation of the problem in the previous issue. The problem is a variation of the problem in the previous issue.

$$\int_0^{\pi^2} \sin \left(\pi^2 x^2 + \frac{1}{x^2} \right) dx = \frac{3}{\sqrt{2\pi}}$$

935. [Spring 1998] Proposed by

From a stack of n cards at number n , show that the probability of an arithmetic progression is

$$\frac{1}{n} \left(1 + \frac{1}{n} \right)$$

HOW MANY MATHEMATICIANS

WANT TO KNOW HOW MANY MATHEMATICIANS

ARE THERE ANY MATHEMATICIANS

WHO ARE THERE ANY MATHEMATICIANS

THEY ARE THERE

THEY ARE THERE

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THE STATE OF NEW YORK

THE STATE OF NEW YORK

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