62. What is $(|-2x|-|3x|)-|\,|3x|-|-5x|\,|$?

(A) x **(B)** $-|x|$ **(C)** $2x$ **(D)** $-3|x|$ **(E)** $-5|x|$

63. M is a function of n variables defined as follows: $M(x_1, x_2, , x_n) = (x_1 + x_2 + \cdots + x_n)/n$. In other words, it is simply the mean value of its arguments. Which one of the following properties is correct?

(A) $M(x_1, x_2, x_3, x_4) = M(M(x_1, x_2), M(x_3, x_4))$

(B) $M(x_1, x_2, x_3, x_4) = M(M(x_1, x_2) + M(x_3, x_4))$

(C) $M(x_1, x_2, x_3, x_4) = M(x_1 + x_2, x_3 + x_4)$

(D) $M(x_1, x_2, x_3, x_4) = M(M(x_1, x_2), x_3, x_4)$

(E) $M(x_1, x_2, x_3, x_4) = x_1 + M(x_2, x_3) + x_4$

64. The ellipse $\frac{x^2}{4} + \frac{y^2}{1} = 1$ is rotated about the x-axis to form an ellipsoid. The largest possible sphere is inscribed in the ellipsoid, and then the largest possible cube is inscribed in the sphere. What is the cube's volume?

(A) $\dfrac{2\sqrt{3}}{3}$ **(B)** $\dfrac{3}{2}$ **(C)** $\dfrac{8\sqrt{3}}{9}$ **(D)** $\dfrac{\pi\sqrt{3}}{3}$ **(E)** $\dfrac{3\sqrt{3}}{2}$

65. The area of rhombus $ABCD$ is 64 square units less than the area of square $EFGH$ but their perimeters are equal. If $\sin\angle AB$ is 0.05 less than $\sin\angle EFG$, what is the number of square units in the area of $ABCD$?

66. A solid tetrahedron is sliced off a solid wooden unit cube by a plane passing through two nonadjacent vertices on one face and one vertex on the opposite face not adjacent to either of the first two vertices. The process is repeated for a second cube. The two cubes are then glued together by matching the cut surfaces. Let a be the numerical value of the surface area of the resulting solid, and let v be its volume. What is a/v?

(A) $4\sqrt{2}$ **(B)** 5 **(C)** $\dfrac{27}{5}$ **(D)** 6 **(E)** $\dfrac{27}{4}$

67. The Collatz function f is defined on the set of positive integers by the rule that if n is even then $f(n) = n/2$, and if n is odd then $f(n) = 3n+1$. Let $f_1(n) = f(n)$, and for $k \geq 2$ let $f_k(n) = f(f_{k-1}(n))$. What is the smallest value of k such that $f_k(9) = 1$?

68. A triangle has vertices at $(0, 0)$, $(2012, 0)$, and $(0, 40)$. How many lattice points (points whose coordinates are both integers) lie strictly in the interior of this triangle?

69. What is the value of $(1 + \cos\beta)^2 + \sin^2\beta - 2\cos\beta$?

(A) 0 **(B)** 1 **(C)** 2 **(D)** $\cos\beta$ **(E)** $\sin^2\beta$

70. The four consecutive vertices of rhombus $ABCD$ have coordinates (a, b), (c, d), (e, f), and (g, h). If $\log_{10}\left(\dfrac{b-f}{a-e}\right) = 1$ and $d = 2 + h$, then what is the value of $g - c$?

(A) -20 **(B)** $-\dfrac{4}{5}$ **(C)** -2 **(D)** $\dfrac{4}{5}$ **(E)** 20

71. In an isosceles trapezoid, the parallel bases have lengths $\log 3$ and $\log 192$, and the altitude to these bases has length $\log 16$. The perimeter of the trapezoid can be written in the form $\log 2^p 3^q$, where p and q are positive integers. What is $p + q$?