1. If $f(x) = x^2 - 5$ and $g(x) = 2x - 3$, which of the following is true about $r = f(-2)$, $s = g(-2)$, and $t = f(g(-2))$?

   A. $t < r < s$ B. $s < r < t$ C. $s < t < r$ D. $r < s < t$ E. $r < t < s$

2. For $1 \le x \le 2$, which of the following is equal to $\left||x - 3| - |1 - x|\right|$?

   A. $2x - 4$ B. $4 - 2x$ C. $2 - 2x$ D. 2 E. 4

3. A line has slope 2, and the sum of its intercepts is k. If the line is shifted vertically upward by 4 units, the sum of the intercepts of the shifted line is

   A. $k + 2$ B. $k + 4$ C. $k + 8$ D. $k - 2$ E. $k - 4$

4. Each day Carlos makes an open-faced sandwich (that is, with only one slice of bread) with either one kind of meat or one kind of cheese or both. If he has four kinds of bread, five kinds of meat, and three kinds of cheese, how many different sandwiches can he make?

   A. 60 B. 72 C. 80 D. 92 E. 96

5. George invests a certain amount of money in the stock market. After his investment increases by 10%, he takes out \$150 and sets it aside. His remaining investment then decreases by 10%. If George's total (including the \$150 set aside) shows a net increase of 4%, by how much has his total investment increased?

   A. \$6 B. \$10 C. \$12 D. \$16 E. \$20

6. Call a date *lucky* if the number of the month is a factor of the number of the day. For example, Valentine's Day, February 14, is lucky (2 is a factor of 14), but Christmas Day, December 25, is not (12 is not a factor of 25). What is the greatest number of consecutive months having equal numbers of lucky days?

   A. 1 B. 2 C. 3 D. 4 E. 5

7. If AM + AT = YC, where each different letter represents a different digit and each letter pair represents a two-digit number, what is the largest possible value of YC?

   A. 89 B. 91 C. 95 D. 97 E. 98

8. The domain of the real-valued function $f(x) = \sqrt{4 - \sqrt{4 - x}}$ is

   A. $x \ge 4$ B. $4 \le x \le 20$ C. $0 \le x \le 4$ D. $-4 \le x \le 4$ E. $-12 \le x \le 4$

9. Define the sequence a_n by $a_1 = 7$, $a_2 = 3$, and (for $n \ge 3$) $a_n = a_{n-1} - a_{n-2}$. Then $a_{2001} =$

   A. -3 B. -4 C. 3 D. 4 E. 7

10. The area bounded by the quadrilateral whose vertices are the x- and y-intercepts of the lines with equations $4x - 3y = 18$ and $3y - 4x = 12$ is

    A. 37.5 B. 40 C. 42.5 D. 45 E. 48

11. The perpendicular distance between the two parallel lines whose equations are given in problem 10 is

    A. 3 B. 4 C. 5 D. 6 E. 7

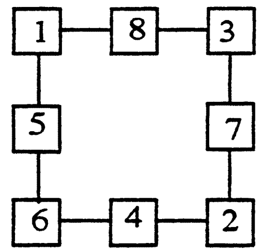
12. A set of 2001 different positive integers are arranged so that $a_1 < a_2 < a_3 < \ldots < a_{2001}$. If the values with odd subscripts are all increased by 1, and those with even subscripts are all decreased by 1, which of the following must be true about the mean μ and median m of the set?

    A. μ decreases by less than 1 and m decreases by 1
    B. μ increases by less than 1 and m increases by 1
    C. μ decreases by less than 1 and m is either unchanged or decreases by 1
    D. μ increases by less than 1 and m is either unchanged or increases by 1
    E. μ and m are both unchanged

13. Right ΔABC (right angle at B) has $m\angle ACB = \alpha$ and $BC = 1$. Right ΔACD (right angle at C) has $m\angle ADC = \alpha$. Then CD =

A. $\cos\alpha$ B. $\sin\alpha$ C. $\tan\alpha$ D. $\cot\alpha$ E. $\csc\alpha$

14. The numbers 1, 2, 3, 4, 5, 6, 7, and 8 are each placed at a different point on a square, either a vertex or a midpoint of a side, in such a way that the sums of the three numbers on each side are all equal (an example with a common sum of 12 is shown at the right). What is the largest possible common sum?



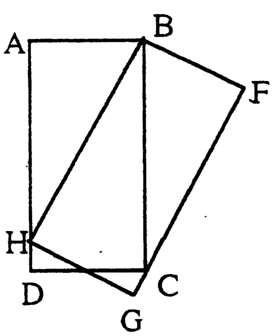
A. 13 B. 14 C. 15 D. 16 E. 17

15. The function f is one-to-one, and the sum of all of the intercepts of the graph of $y = f(x)$ is 5. The sum of all of the intercepts of the graph of $y = f^{-1}(x)$ is

A. 5 B. $\frac{1}{5}$ C. -5 D. $\frac{5}{2}$ E. $\frac{2}{5}$

16. An infinite geometric series s_n $(n \geq 1)$ has sum $\frac{8}{3}$. If the sum of the series t_n for which $t_n = s_n^2$ is twice s_1, the common ratio of the series s_n is

A. $\frac{1}{9}$ B. $\frac{2}{9}$ C. $\frac{1}{3}$ D. $\frac{4}{9}$ E. $\frac{5}{9}$



17. Rectangle ABCD, with AB = 5 in and BC = 13 in, and rectangle BFGH, with BF = 5 in and BH = BC, are placed side by side so that $\overline{BC}$ and $\overline{BH}$ coincide. If rectangle BFGH is rotated around point B until H lies on $\overline{AD}$ and C lies on $\overline{FG}$, the area of the overlap in square inches is closest to

A. 31.2 B. 32.5 C. 33.0 D. 33.8 E. 40.0

18. Define a function f(n) with domain the positive integers as follows: $f(n) = \begin{cases} n + 15 \text{ for n odd} \\ \frac{n}{2} \text{ for n even} \end{cases}$. Let g(n) be the smallest number in the set {f(n), f(f(n)), f(f(f(n))), ... }. How many numbers are in the range of g?

A. 2 B. 3 C. 4 D. 5 E. an infinite number

19. The last two digits of the product of the least common multiple and greatest common factor of $2001! - 1$ and $2^{2001} + 1$ are

A. 01 B. 47 C. 51 D. 53 E. 99

20. The remainder when the polynomial $P(x) = 3x^{500} - 2x^{400} - x^{301} + 2x^{203} - 5x^{101}$ is divided by $x^2 - 1$ is

A. -3 B. $2x - 1$ C. $-2x - 1$ D. $4x + 1$ E. $-4x + 1$