

QUESTION 1

Let $f(x) = 2x^4 - x^2 + 100$ and $h(x) = 5x^3 + 3x$.

$$A = f(-3)$$

$$B = h(2)$$

$$C = f(3)$$

$$D = h(-2)$$

Compute $A + B + C + D$.

QUESTION 2

Let $a@b = a(b - a) + a - b^2$ and let $a * b = b - a + b^2 - a^2$.

Then

$$A = (3@2)$$

$$B = (2 * 4)$$

$$C = (4@(2 * 3))$$

$$D = x@x$$

Compute $A + B + C + D$.

QUESTION 3

A = the degree of the multivariable polynomial $a^3b^2 + ab^4 + a^6 + ab^4$

B = the larger solution of $3(x - 4)^2 = 27$

C = the sum of the squares of the roots of $x^2 - 6x + 8 = 0$

D = the product of the solution(s) of $3x^2 + 5x - 18 = 0$

Compute $A + B + C + D$.

QUESTION 4

John received a bag of marbles for his birthday. The bag of marbles contains 6 red marbles, 8 white marbles, and 10 black marbles. John tries to solve various probability questions. Help John solve the following questions. (Note: John picks marbles one at a time and without replacement.)

A = the probability of selecting a red marble after removing all of the black marbles

B = the probability of selecting two red marbles

C = the probability of selecting a red and then a white marble in that order

D = the probability of not selecting a black marble

Compute $7A + 92B + 23C + 12D$ in simplest form.

QUESTION 5

Start with 0. For every true statement, add 4 to your answer. For every false statement, subtract 1 from your answer.

π is a irrational number

$\frac{23}{9}$ is an integer

-4 is a whole number

$\sqrt{6}$ is rational

-2 is a natural number

3 is a real number

What is the final answer?

QUESTION 6

Let

$$A = \left(\frac{1}{2}\right) \left(\frac{2}{3}\right) \left(\frac{3}{4}\right) \cdots \left(\frac{99}{100}\right)$$

B = the sum of the prime factors of 2014

C = the product of the prime factors of 2014

D = the rationalization of $\frac{6}{(4 + \sqrt{5})}$

Compute $100A + B + C + 11D$.

QUESTION 7

Consider the set of numbers $\{4, 4, 4, 4, 4, 5, 5, 5, 5, 5, 5, 5, 5, 6, 6, 6, 6, 6, 7, 7, 7, 10\}$.

A = the mean of this set + the mode of this set

B = the range of this set

Compute the harmonic mean of $20A$ and B .

QUESTION 8

Simplify $\frac{x^6w^{-3}z^5y^2w^4}{z^{-3}yw^9x^8z^{-1}}$ so that there are no negative exponents.

QUESTION 9

Let

A = the minimum value of $y = (x - 4)^2 + 3$

B = the maximum value of $y = (7 - x)(x - 11)$

C = the sum of coordinates of the vertex of $y = (x - 2)(x - 4)$

D = the sum of the reciprocals of the roots of $7x^2 + 5x + 70 = 0$

Find $A + B + C + 70D$.

QUESTION 10

Let

A = the sum of the coordinates of the midpoint of the segment with endpoints $(2,10)$ and $(8, 12)$

B = the magnitude of the segment with endpoints $(5,10)$ and $(8,14)$

C = the slope of the line perpendicular to $y=7x+4$

D = the number of distinct ways you can arrange the letters in the word JEEWOO

Find $A + B + 7C + D$.

QUESTION 11

Let

A = the number of solutions to $11x + 5 = 15x + 3$

B = the area of the part of a circle with a radius of 6 that is centered at the origin with the following restrictions:
 $x > 0, y > 0$

C = the area bounded by the x and y axis and the line $x + y = 5$

Compute $A + \frac{B}{9\pi} + C$

QUESTION 12

Let

A = the number of integral values of x that satisfy $|3x + 4| < 5$

B = the number of integral values of x that satisfy $|x - 15| < 14$

C = the number of integral values of x that satisfy $|4x - 12| < 10$

Find $A^2B^{-1}C$.

QUESTION 13

Find the sum of the coordinates of the 3 points of intersection of the following lines

$$y = 4x + 4$$

$$y = 3x + 13$$

$$y = -5x - 3.$$

QUESTION 14

A = 45 is a complex number

B = Every quadratic has two distinct complex roots

C = 2819 is prime

D = If the discriminant of a quadratic is zero, then the quadratic has no solutions

E = $4+3i$ is an imaginary number

F = Irrational numbers are subsets of imaginary numbers

How many of the following are true?