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QUADRATICS

- 2010A 21. The polynomial $x^3 - ax^2 + bx - 2010$ has three positive integer zeros. What is the smallest possible value of a ?
- (A) 78 (B) 88 (C) 98 (D) 108 (E) 118

- 2018A 21. Which of the following describes the set of values of a for which the curves $x^2 + y^2 = a^2$ and $y = x^2 - a$ in the real xy -plane intersect at exactly 3 points?

(A) $a = \frac{1}{4}$ (B) $\frac{1}{4} < a < \frac{1}{2}$ (C) $a > \frac{1}{4}$ (D) $a = \frac{1}{2}$
(E) $a > \frac{1}{2}$

- 2015A 23. The zeros of the function $f(x) = x^2 - ax + 2a$ are integers. What is the sum of the possible values of a ?

(A) 7 (B) 8 (C) 16 (D) 17 (E) 18

- 2000 24. Let f be a function for which $f(x/3) = x^2 + x + 1$. Find the sum of all values of z for which $f(3z) = 7$.

(A) $-1/3$ (B) $-1/9$ (C) 0 (D) $5/9$ (E) $5/3$

- 2017A 24. For certain real numbers a , b , and c , the polynomial

$$g(x) = x^3 + ax^2 + x + 10$$

has three distinct roots, and each root of $g(x)$ is also a root of the polynomial

$$f(x) = x^4 + x^3 + bx^2 + 100x + c.$$

What is $f(1)$?

- (A) -9009 (B) -8008 (C) -7007 (D) -6006 (E) -5005

- 2010B 25. Let $a > 0$, and let $P(x)$ be a polynomial with integer coefficients such that

$$P(1) = P(3) = P(5) = P(7) = a, \text{ and}$$

$$P(2) = P(4) = P(6) = P(8) = -a.$$

What is the smallest possible value of a ?

- (A) 105 (B) 315 (C) 945 (D) $7!$ (E) $8!$

- 2018B 25. Let $[x]$ denote the greatest integer less than or equal to x . How many real numbers x satisfy the equation $x^2 + 10,000[x] = 10,000x$?

- (A) 197 (B) 198 (C) 199 (D) 200 (E) 201