

1. Let  $a$ ,  $b$ , and  $c$  be real numbers such that  $a - 7b + 8c = 4$  and  $8a + 4b - c = 7$ . Then  $a^2 - b^2 + c^2$  is

- (A) 0    (B) 1    (C) 4    (D) 7    (E) 8

2. What non-zero real value for  $x$  satisfies  $(7x)^{14} = (14x)^7$ ?

- (A)  $\frac{1}{7}$     (B)  $\frac{2}{7}$     (C) 1    (D) 7    (E) 14

3. A parabola with equation  $y = x^2 + bx + c$  passes through the points  $(2, 3)$  and  $(4, 3)$ . What is  $c$ ?

- (A) 2    (B) 5    (C) 7    (D) 10    (E) 11

4. Which of the following is equivalent to  $\sqrt{\frac{x}{1 - \frac{x-1}{x}}}$  when  $x < 0$ ?

- (A)  $-x$     (B)  $x$     (C) 1    (D)  $\sqrt{\frac{x}{2}}$     (E)  $x\sqrt{-1}$

5. The lines  $x = \frac{1}{4}y + a$  and  $y = \frac{1}{4}x + b$  intersect at the point  $(1, 2)$ . What is  $a + b$ ?

- (A) 0    (B)  $\frac{3}{4}$     (C) 1    (D) 2    (E)  $\frac{9}{4}$

6. Let  $a$  and  $b$  be the roots of the equation  $x^2 - mx + 2 = 0$ . Suppose that  $a + (1/b)$  and  $b + (1/a)$  are the roots of the equation  $x^2 - px + q = 0$ . What is  $q$ ?

- (A)  $\frac{5}{2}$     (B)  $\frac{7}{2}$     (C) 4    (D)  $\frac{9}{2}$     (E) 8

7. The expression

$$(x + y + z)^{2006} + (x - y - z)^{2006}$$

is simplified by expanding it and combining like terms. How many terms are in the simplified expression?

- (A) 6018    (B) 671,676    (C) 1,007,514    (D) 1,008,016    (E) 2,015,028