

More practices on factoring and rational expressions  
From AMC 10's

1. The ratio  $\frac{10^{2000} + 10^{2002}}{10^{2001} + 10^{2001}}$  is closest to which of the following numbers?

- (A) 0.1      (B) 0.2      (C) 1      (D) 5      (E) 10

1. The ratio  $\frac{2^{2001} \cdot 3^{2003}}{6^{2002}}$  is

- (A)  $\frac{1}{6}$       (B)  $\frac{1}{3}$       (C)  $\frac{1}{2}$       (D)  $\frac{2}{3}$       (E)  $\frac{3}{2}$

3. Which of the following is equal to  $1 + \frac{1}{1 + \frac{1}{1+1}}$ ?

- (A)  $\frac{5}{4}$       (B)  $\frac{3}{2}$       (C)  $\frac{5}{3}$       (D) 2      (E) 3

4. What is the value of

$$(3x - 2)(4x + 1) - (3x - 2)4x + 1$$

when  $x = 4$ ?

- (A) 0      (B) 1      (C) 10      (D) 11      (E) 12

6. For how many positive integers  $n$  is  $n^2 - 3n + 2$  a prime number?

- (A) none      (B) one      (C) two      (D) more than two, but finitely many  
(E) infinitely many

7. 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)  $x\sqrt{-1}$

7. The fraction

$$\frac{(3^{2008})^2 - (3^{2006})^2}{(3^{2007})^2 - (3^{2005})^2}$$

simplifies to which of the following?

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

10. Compute the sum of all the roots of  $(2x + 3)(x - 4) + (2x + 3)(x - 6) = 0$ .

- (A)  $7/2$     (B)  $4$     (C)  $5$     (D)  $7$     (E)  $13$

20. Suppose that the number  $a$  satisfies the equation  $4 = a + a^{-1}$ . What is the value of  $a^4 + a^{-4}$ ?

- (A)  $164$     (B)  $172$     (C)  $192$     (D)  $194$     (E)  $212$