

Polynomials

1. Non-Calculator

$$(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2)$$

Which of the following is equivalent to the expression above?

- A) $4x^2y^2$
- B) $8xy^2 - 6y^2$
- C) $2x^2y + 2xy^2$
- D) $2x^2y + 8xy^2 - 6y^2$

$$\begin{aligned} & \boxed{x^2y} - \cancel{3y^2} + \boxed{5xy^2} + \boxed{x^2y} - \cancel{3xy^2} + \cancel{3y^2} \\ & = 2x^2y + 2xy^2 \end{aligned}$$

2. Calculator

$$3x^2 - 5x + 2$$

$$5x^2 - 2x - 6$$

Which of the following is the sum of the two polynomials shown above?

- A) $8x^2 - 7x - 4$
- B) $8x^2 + 7x - 4$
- C) $8x^4 - 7x^2 - 4$
- D) $8x^4 + 7x^2 - 4$

$$\begin{array}{r} 3x^2 - 5x + 2 \\ + 5x^2 - 2x - 6 \\ \hline 8x^2 - 7x - 4 \end{array}$$

3. Calculator

$$(-3x^2 + 5x - 2) - 2(x^2 - 2x - 1)$$

If the expression above is rewritten in the form $ax^2 + bx + c$, where a , b , and c are constants, what is the value of b ?

$$\begin{aligned} & -3x^2 + 5x - 2 - 2x^2 + 4x + 1 \\ & = -5x^2 + 9x - 1 \end{aligned}$$

(a) (b) (c)

$$b = \boxed{9}$$

4. Calculator

In the xy -plane, the graph of function f has x -intercepts at -3 , -1 , and 1 . Which of the following could define f ?

- A) $f(x) = (x - 3)(x - 1)(x + 1)$
- B) $f(x) = (x - 3)(x - 1)^2$
- C) $f(x) = (x - 1)(x + 1)(x + 3)$
- D) $f(x) = (x + 1)^2(x + 3)$

5. Non-Calculator

Which of the following is equivalent to the sum of the expressions $a^2 - 1$ and $a + 1$?

- (A) $a^2 + a$
- B) $a^3 - 1$
- C) $2a^2$
- D) a^3

$$a^2 - \cancel{1} + a + \cancel{1}$$

$$= a^2 + a$$

6. Calculator

Which of the following is an equivalent form of $(1.5x - 2.4)^2 - (5.2x^2 - 6.4)$?

- A) $-2.2x^2 + 1.6$
- B) $-2.2x^2 + 11.2$
- (C) $-2.95x^2 - 7.2x + 12.16$
- D) $-2.95x^2 - 7.2x + 0.64$

$$= (1.5x - 2.4)(1.5x - 2.4) - (5.2x^2 - 6.4)$$

	1.5x	-2.4
1.5x	2.25x ²	-3.6x
-2.4	-3.6x	5.76

$$= 2.25x^2 - 7.2x + 5.76 - 5.2x^2 + 6.4$$

$$= -2.95x^2 - 7.2x + 12.16$$

7. Calculator

Which expression is equivalent to $(2x^2 - 4) - (-3x^2 + 2x - 7)$?

- (A) $5x^2 - 2x + 3$
- B) $5x^2 + 2x - 3$
- C) $-x^2 - 2x - 11$
- D) $-x^2 + 2x - 11$

$$= 2x^2 - 4 + 3x^2 - 2x + 7$$

$$= 5x^2 - 2x + 3$$

8. Calculator

For a polynomial $p(x)$, the value of $p(3)$ is -2 . Which of the following must be true about $p(x)$?

- A) $x - 5$ is a factor of $p(x)$.
 - B) $x - 2$ is a factor of $p(x)$.
 - C) $x + 2$ is a factor of $p(x)$.
 - (D) The remainder when $p(x)$ is divided by $x - 3$ is -2 .
- } it's a factor when it equals zero, not -2

9. Non-Calculator

$$9a^4 + 12a^2b^2 + 4b^4$$

Which of the following is equivalent to the expression shown above?

(A) $(3a^2 + 2b^2)^2 = (3a^2 + 2b^2)(3a^2 + 2b^2)$

B) $(3a + 2b)^4$

~~C) $(9a^2 + 4b^2)^2$~~

~~D) $(9a + 4b)^4$~~

	$3a^2$	$2b^2$	
$3a^2$	$9a^4$	$6a^2b^2$	
$2b^2$	$6a^2b^2$	$4b^4$	

$$= 9a^4 + \underbrace{6a^2b^2 + 6a^2b^2}_{12a^2b^2} + 4b^4$$

$$= 9a^4 + 12a^2b^2 + 4b^4 \checkmark$$

10. Non-Calculator

$$x^3(x^2 - 5) = -4x$$

If $x > 0$, what is one possible solution to the equation above?

$$\begin{array}{r} x^5 - 5x^3 = -4x \\ \hline +4x \quad +4x \end{array}$$

$$x^5 - 5x^3 + 4x = 0$$

* must equal zero to solve

$$x(x^4 - 5x^2 + 4) = 0$$

* factor out GCF

	x^2	-4
x^2	x^4	$-4x^2$
-1	$-x^2$	4

Mult: $4x^4$

Add: $-5x^2$

$$x(x^2 - 1)(x^2 - 4) = 0$$

$$x(x-1)(x+1)(x-2)(x+2) = 0$$

* difference of squares

$$\begin{array}{cccccc} \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \\ x=0 & x=1 & x=-1 & x=2 & x=-2 & \end{array}$$

$x = 1, 2$

11. Non-Calculator

$$x^3 - 5x^2 + 2x - 10 = 0$$

For what real value of x is the equation above true?

	x	-5
x^2	x^3	$-5x^2$
2	$2x$	-10

$$(x^2 + 2)(x - 5) = 0$$

$$\begin{array}{r} \downarrow \\ x^2 + 2 = 0 \\ \hline -2 \quad -2 \\ \hline x^2 = -2 \end{array}$$

$$x = \pm \sqrt{-2}$$

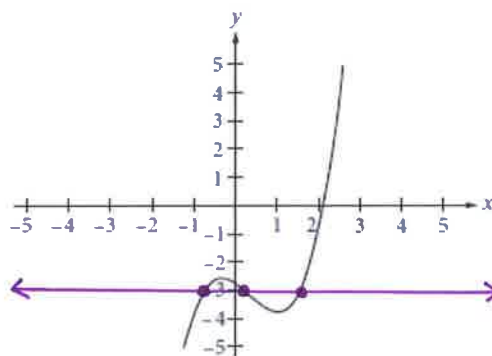
$$x = \pm i\sqrt{2}$$

*not real

$$\begin{array}{r} \downarrow \\ x - 5 = 0 \\ \hline +5 \quad +5 \\ \hline \end{array}$$

$x = 5$

12. Calculator



The function $f(x) = x^3 - x^2 - x - \frac{11}{4}$ is graphed in the xy -plane above. If k is a constant such that the equation $f(x) = k$ has three real solutions, which of the following could be the value of k ?

- A) 2
- B) 0
- C) -2
- D) -3

13. Calculator

$$f(x) = 2x^3 + 6x^2 + 4x \Rightarrow 2x(x^2 + 3x + 2) \quad * \text{ factor out GCF}$$

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

The polynomials $f(x)$ and $g(x)$ are defined above.
Which of the following polynomials is divisible by $2x + 3$?

A) $h(x) = f(x) + g(x) = 2x \cdot g(x) + g(x)$

B) $p(x) = f(x) + 3g(x) = 2x \cdot g(x) + 3g(x)$

C) $r(x) = 2f(x) + 3g(x) = 2 \cdot 2x \cdot g(x) + 3 \cdot g(x)$

D) $s(x) = 3f(x) + 2g(x)$
 $= 3 \cdot 2x \cdot g(x) + 2 \cdot g(x)$

So... $f(x) = 2x \cdot g(x) !$