

CR Algebra 2

Name _____

Fall Review for Midterm (Units 1-3) MC

Date _____ Period _____

Name each polynomial by degree and number of terms.

1) $3r^2 - 8r + 5$

- A) quintic monomial
- B) cubic trinomial
- C) quadratic trinomial**
- D) linear trinomial

2) $-3x + 5x^4$

- A) quintic trinomial
- B) quartic monomial
- C) quartic binomial**
- D) quadratic polynomial with four terms

Simplify each expression.

3) $(5k^3 - 6k) + (8k + 4k^3 + k^2)$

- A) $12k^3 + k^2 + 2k$
- B) $2k^3 + k^2 + 2k$
- C) $12k^3 + k^2 + 5k$
- D) $9k^3 + k^2 + 2k$**

4) $(8 - 4k - 5k^2) - (8k^2 - 8 + 7k)$

- A) $-13k^2 - 11k + 16$**
- B) $-7k^2 - 7k + 21$
- C) $-7k^2 - 11k + 21$
- D) $-13k^2 - 11k + 21$

*1, 2, 8, 3
221*

Find each product.

5) $(b + 2)(2b - 4)$

- A) $2b^2 - 8$**
- B) $15b^2 - 17b + 4$
- C) $3b^2 - 19b - 14$
- D) $3b^2 - 14$

2b²

only choice with 2b²

6) $(7k - 3)(3k^2 - 7k + 4)$

- A) $12k^3 - 36k^2 + 34k - 20$
- B) $9k^3 - 12k^2 - 41k - 12$
- C) $21k^3 - 58k^2 + 49k - 12$**
- D) $49k^3 + 70k^2 + 65k + 56$

2k³

← only choice with 2k³

Simplify.

7) $(-2 + i)(5 - 7i)$

- A) $1 + i$
- B) $-7 + 8i$**
- C) $-3 + 6i$
- D) $-7 - 6i$

*-2 + i - 5 + 7i
-7 + 8i*

8) $(-3 + 4i)(4 - 4i)$

- A) $4 + 28i$**
- B) $-28 - 4i$
- C) $8 + 24i$
- D) $6 - 8i$

*4 - 4i
-3 | -12 | 12i
+4i | 16i | -16i² → 16
4 + 28i*

9) $\sqrt{75}$

- A) 10
- B) $8\sqrt{7}$
- C) $5\sqrt{3}$
- D) $7\sqrt{6}$

*11i
BY*

10) $\sqrt{-80}$

- A) $6i\sqrt{5}$
- B) $4i\sqrt{5}$
- C) $6i\sqrt{3}$
- D) $7i\sqrt{2}$

Factor each completely.

11) $m^2 - 16$

- A) $5(m - 4)(m - 3)$
- B) $(m + 16)(m - 1)$
- C) $(m - 4)(m + 4)$**
- D) $(m - 4)^2$

12) $6b^2 - 20b$

- A) $(b - 8)(9b + 8)$
- B) $6b(b - 5)$
- C) $2b(3b - 10)$**
- D) $2b(3b + 10)$

13) $n^2 - 13n + 36$

- A) $(n + 9)(n - 4)$
- B) $(n - 9)(n - 4)$**
- C) $(n + 3)(n + 12)$
- D) $(n - 9)(n + 4)$

14) $4x^2 - 23x + 15$

- A) $(x - 5)(4x - 3)$**
- B) $(4x - 5)(x - 3)$
- C) $(2x + 3)(2x + 5)$
- D) Not factorable

15) $64x^3 + 27$ Sum of cubes

- A) ~~$(4x-3)(16x^2 + 12x + 9)$~~
 B) $(4x+3)(16x^2 - 12x + 9)$
 C) $(4x+3)(4x-3)^2$
 D) ~~$(4x+3)^3$~~

16) $2k^3 - 3k^2 - 4k + 6$ Grouping/Box

- A) $2(k^2 - 3)(k + 1)$
 B) $(k^2 - 2)(2k - 3)$
 C) $2(k^2 + 2)(k - 1)$
 D) $2(k^2 - 2)(k - 1)$
- | | | |
|-------|--------|---------|
| | $2k$ | -3 |
| k^2 | $2k^3$ | $-3k^2$ |
| -2 | $-4k$ | $+6$ |

Solve each equation by factoring.

17) $x^2 - 3x - 18 = 0$

- A) $\{6, -3\}$ B) $\{4, 6\}$
 C) $\{-6, -4\}$ D) $\{6, -6\}$

$(x+3)(x-6) = 0$
 $x = -3$ $x = 6$

Solve each equation by taking square roots.

18) $x^2 = -81$

- A) $\{9i, -9i\}$
 B) $\{i\sqrt{21}, -i\sqrt{21}\}$
 C) $\{-21, 21\}$
 D) $\{-81, 81\}$

$\pm\sqrt{-81} = \pm 9i$

19) $m^2 - 3 = 46$

- A) $\{\sqrt{43}\}$ B) $\{\sqrt{43}, -\sqrt{43}\}$
 C) $\{7, -7\}$ D) $\{49, -49\}$

$m^2 = 49$

Solve each equation by completing the square.

20) $n^2 - 14n + 7 = 0$

- A) $\{20, -2\}$
 B) $\{16 + \sqrt{227}, 16 - \sqrt{227}\}$
 C) $\{7 + \sqrt{42}, 7 - \sqrt{42}\}$
 D) $\{8 + \sqrt{35}, 8 - \sqrt{35}\}$

$n - 14n + 7 = -7 + 14$
 $(n-7)^2 = 42$
 $n-7 = \sqrt{42}$
 $n = 7 \pm \sqrt{42}$

Solve each equation with the quadratic formula.

21) $n^2 - n - 4 = 0$

- A) $\{i\sqrt{2}, -i\sqrt{2}\}$
 B) $\{\sqrt{2}, -\sqrt{2}\}$
 C) $\left\{\frac{\sqrt{6}}{2}, -\frac{\sqrt{6}}{2}\right\}$
 D) $\left\{\frac{1 + \sqrt{17}}{2}, \frac{1 - \sqrt{17}}{2}\right\}$

$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-4)}}{2(1)}$
 $\frac{1 \pm \sqrt{17}}{2}$

State the maximum number of turns the graph of each function could make.

22) $f(x) = x^4 + x^3 - 4x^2 + 2$

- A) Max # Turns: 1
 B) Max # Turns: 0
 C) Max # Turns: 3
 D) Max # Turns: 5

Turns = Degree - 1

State the actual number of zeros of each function.

23) $f(x) = x^4 - 4x^3 + 4x^2 - x + 4$

State the actual number of zeros of each function.

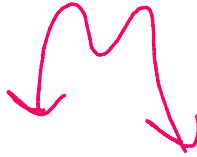
23) $f(x) = x^4 - 4x^3 + 4x^2 - x + 4$

- A) # Real Zeros: 1
- B) # Real Zeros: 2
- C) # Real Zeros: 3
- D) # Real Zeros: 4**

Describe the end behavior of each function.

24) $f(x) = -x^4 - x^3 + 2x^2 - 4$

- A) ~~$f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$
 $f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$~~
- B) ~~$f(x) \rightarrow +\infty$ as $x \rightarrow -\infty$
 $f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$~~
- C) ~~$f(x) \rightarrow +\infty$ as $x \rightarrow -\infty$
 $f(x) \rightarrow -\infty$ as $x \rightarrow +\infty$~~
- D) $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$
 $f(x) \rightarrow -\infty$ as $x \rightarrow +\infty$**



Perform the indicated operation.

25) $f(x) = 3x + 1$
 $g(x) = x^3 + 4x^2$
Find $f(g(x))$

$3(x^3 + 4x^2) + 1$
 $3x^3 + 12x^2 + 1$

- A) $3x^3 + 12x^2 + 1$**
- B) $27x^3 + 63x^2 + 33x + 5$
- C) $-6x$
- D) $-27x^3 + 63x^2 - 33x + 5$

26) $f(x) = x^2 + 4x$
 $g(x) = 4x + 4$
Find $f(x) - g(x)$

$x^2 + 4x - (4x + 4)$
 $x^2 + 4x - 4x - 4$
 $x^2 - 4$

- A) -7
- B) $x^2 - 4$**
- C) $-x^3 - 4x^2 + 4x + 5$
- D) $-x^2 + 4$

27) $f(n) = 2n - 3 = 2(5) - 3 = 7$
 $g(n) = n^2 - 2 = (5)^2 - 2 = 23$
Find $(f + g)(5)$
 $7 + 23 = 30$

- A) 10
- B) -5
- C) 30**
- D) 58

28) $g(t) = -3t - 1 = -3(1) - 1 = -4$
 $f(t) = t^3 - 4t^2 = (1)^3 - 4(1)^2 = -3$
Find $(g \cdot f)(1)$
 $-4(-3) = 12$

- A) 0
- B) 56
- C) 12**
- D) -10

Divide.

29) $(9r^4 + 44r^3 - 51r^2 + 58r + 15) \div (r + 6)$

A) $9r^3 - 10r^2 + 9r + 7 - \frac{10}{r+6}$
B) $9r^3 - 10r^2 + 9r + 4 - \frac{9}{r+6}$
C) $9r^3 - 10r^2 + 9r + 5 - \frac{9}{r+6}$
D) $9r^3 - 10r^2 + 9r + 1 - \frac{6}{r+6}$

$\begin{array}{r} -6 \ 9 \ 44 \ -51 \ 58 \ 15 \\ \underline{9 \ -10 \ 9 \ 4 \ -9} \\ -6 \ 9 \ 44 \ -51 \ 58 \ 15 \\ \underline{-9 \ 10 \ -9 \ -4 \ 9} \\ 9 \ -10 \ 9 \ 4 \ -9 \end{array}$

30) $(n^4 + 8n^3 + 16n^2 - 2) \div (n + 1)$

A) $n^3 + 7n^2 + 9n - 9 + \frac{4}{n+1}$
B) $n^3 + 7n^2 + 9n - 6 + \frac{11}{n+1}$
C) $n^3 + 7n^2 + 9n - 7 + \frac{10}{n+1}$
D) $n^3 + 7n^2 + 9n - 9 + \frac{7}{n+1}$

$n = -1$

$\begin{array}{r} -1 \ | \ 1 \ 8 \ 16 \ 0 \ -2 \\ \underline{-1 \ -7 \ -9 \ 9} \\ 1 \ 7 \ 9 \ -9 \ 7 \end{array}$

$n^3 + 7n^2 + 9n - 9 + \frac{7}{n+1}$

State if the given binomial is a factor of the given polynomial.

31) $(r^3 + 16r^2 + 59r - 40) \div (r + 8)$

- A) No **(B)** Yes

$$\begin{array}{r} -8 \overline{) 1 \ 16 \ 59 \ -40} \\ \underline{1 \ 8 \ -5 \ 0} \\ 0 \end{array}$$

State the possible rational roots for each equation.

32) $5x^4 + 42x^2 + 16 = 0$

- A) $0, \pm 1, \pm 2, \pm 4, \pm 8, \pm \frac{1}{2}$
 B) $0, \pm 1, \pm 5, \pm \frac{1}{2}, \pm \frac{5}{2}, \pm \frac{1}{4}, \pm \frac{5}{4}, \pm \frac{1}{8}, \pm \frac{5}{8}, \pm \frac{1}{16}, \pm \frac{5}{16}$
(C) $\pm 1, \pm 2, \pm 4, \pm 8, \pm 16, \pm \frac{1}{5}, \pm \frac{2}{5}, \pm \frac{4}{5}, \pm \frac{8}{5}, \pm \frac{16}{5}$
 D) $\pm 1, \pm 2, \pm 4, \pm \frac{1}{2}$

Factor each. One factor has been given.

33) $5x^3 + 16x^2 + 13x + 2 = 0; x + 2$

- A) $(x + 1)^2(5x + 1) = 0$
 B) $(3x + 1)(5x + 1)(x + 2) = 0$
 C) $(x + 1)(3x + 1)(x + 2) = 0$
(D) $(x + 1)(5x + 1)(x + 2) = 0$

$$\begin{array}{r} -2 \overline{) 5 \ 16 \ 13 \ 2} \\ \underline{-10 \ -12 \ -2} \\ 5 \ 0 \ 1 \ 0 \\ (5x+1)(x+1) \end{array}$$

Find all roots. One root has been given.

34) $5x^3 - 26x^2 + 35x - 6 = 0; 3$

- A) $\left\{0, \frac{2}{3}, 3\right\}$ B) $\left\{\frac{1}{7}, 2, \frac{3}{2}\right\}$
(C) $\left\{\frac{1}{5}, 2, 3\right\}$ D) $\left\{-\frac{2}{5}, 2, 1\right\}$

$$\begin{array}{r} 3 \overline{) 5 \ -26 \ 35 \ -6} \\ \underline{15 \ -33 \ 6} \\ 5 \ -11 \ 2 \ 0 \\ 5x^2 - 11x + 2 = 0 \\ (5x-1)(x-2) = 0 \\ x = \frac{1}{5} \quad x = 2 \end{array}$$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

35) 4, -5, 5

- A) $f(x) = x^3 - x^2 - 25x + 100$
 B) $f(x) = x^3 - 7x^2 - 25x + 100$
 C) $f(x) = x^3 - 4x^2 - 26x + 100$
(D) $f(x) = x^3 - 4x^2 - 25x + 100$

$$(x-4)(x+5)(x-5) \rightarrow (x-4)(x^2-25) \rightarrow x^3 - 4x^2 - 25x + 100$$

36) -2, 2i

- A) $f(x) = x^3 + 2x^2 + 4x + 16$
 B) $f(x) = x^3 + 2x^2 + 4x + 15$
(C) $f(x) = x^3 + 2x^2 + 4x + 8$
 D) $f(x) = x^3 + 2x^2 - x + 8$

$$(x+2i)(x-2i)(x+2) \rightarrow (x^2-4i^2)(x+2) \rightarrow (x^2+4)(x+2) \rightarrow x^3 + 2x^2 + 4x + 8$$