

Fall Review for Midterm (Units 1-3) FR

Date _____

Period _____

Name each polynomial by degree and number of terms.

1) $-7 - 7a$

Linear Binomial

2) -5

Constant Monomial

Simplify each expression.

3) $(x - 8) - (2 - 5x + 2x^3)$

$(x - 8) + (-2x^3 + 5x - 2)$

$-2x^3 + 6x - 10$

Find each product.

5) $(2n - 2)(5n - 7)$

$10n^2 - 14n - 10n + 14$

$10n^2 - 24n + 14$

Simplify.

7) $(-5 + 8i) + (-6 - 4i)$

$-11 + 4i$

9) $\sqrt{108} = \sqrt{36 \cdot 3}$

$6\sqrt{3}$

Factor each completely.

11) $2n^3 - 16n^2$

$2n^2(n - 8)$

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

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

$2n^4 + n^3 - 9n^2$

6) $(6n - 4)(2n^2 + 6n - 6)$

$12n^3 + 36n^2 - 36n$
 $-8n^2 - 24n + 24$

$12n^3 + 28n^2 - 60n + 24$

8) $(-5 - 7i)(6 - 6i)$

$-30 + 30i - 42i + 42i^2$ $42i^2 = 42(-1)$

$-30 - 12i - 42$

$-72 - 12i$

10) $\sqrt{-112}$

$\sqrt{-16 \cdot 7}$

$4i\sqrt{7}$

12) $4k^2 - 37k + 63$

$(4k - 9)(k - 7)$

13) $x^2 + 10x + 21$

$(x+7)(x+3)$

14) $4x^2 - 1$

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

15) $8x^3 + 125$
 $a = \sqrt[3]{8x^3} = 2x$
 $b = \sqrt[3]{125} = 5$

$(2x+5)(4x^2 - 10x + 25)$

16) $2x^3 + 4x^2 + 3x + 6$

	x	2
2x ²	2x ³	4x ²
3	3x	6

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

Solve each equation by factoring.

17) $n^2 - 9n + 18 = 0$

$(n-3)(n-6) = 0$
 $n-3=0$ $n-6=0$
 $n=3$ $n=6$

Solve each equation by taking square roots.

18) $\sqrt{n^2} = 100$

$n = \pm 10$

19) $v^2 - 4 = -18$

$\sqrt{v^2} = \sqrt{-14}$
 $v = \pm \sqrt{-14}$
 $v = \pm i\sqrt{14}$

Solve each equation by completing the square.

20) $m^2 - 4m - 96 = 0$

$(\frac{b}{2})^2$
 $m^2 - 4m + 4 = 96 + 4$
 $(-4/2)^2 = (-2)^2 = 4$
 $\sqrt{(m-2)^2} = \sqrt{100}$
 $m-2 = \pm 10$

$m-2=10$ $m-2=-12$
 $m=12$ $m=-10$

Solve each equation with the quadratic formula.

21) $3x^2 - x + 2 = 0$

$a=3$
 $b=-1$
 $c=2$

$x = \frac{1 \pm \sqrt{(-1)^2 - 4(3)(2)}}{2(3)}$
 $\frac{1 \pm \sqrt{-23}}{6} = \frac{1 \pm i\sqrt{23}}{6}$

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

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

degree - 1

$3 - 1 = 2 \text{ turns}$

State the ~~actual~~ number of zeros of each function.

23) $f(x) = x^5 - 3x^3 + x + 1$

5

Describe the end behavior of each function.

24) $f(x) = -x^3 + 2x^2 + 1$

odd negative

as $x \rightarrow -\infty$, $f(x) \rightarrow +\infty$
 $x \rightarrow +\infty$, $f(x) \rightarrow -\infty$

Perform the indicated operation.

25) $h(n) = 2n - 1$

$g(n) = -4n + 1$

Find $h(n) + g(n)$

$(2n - 1) + (-4n + 1)$

$-2n$

26) $g(n) = 3n + 4$

$f(n) = n^3 + 5n$

Find $g(f(n))$

$3(n^3 + 5n) + 4$

$3n^3 + 15n + 4$

27) $g(n) = 2n - 5$

$h(n) = n + 5$

Find $(g \cdot h)(-1)$

$g(-1) = 2(-1) - 5 = -7$

$h(-1) = -1 + 5 = 4$

$-7 \cdot 4 = -28$

28) $g(n) = 2n - 2$

$h(n) = n^3 - 4n^2 + n$

Find $(g \cdot h)(3)$

$g(3) = (2)(3) - 2 = 4$

$h(3) = (3)^3 - 4(3)^2 + 3$

$4 \cdot 3 = 12$

not answer

Divide.

29) $(x^4 - 25x^2 - 10x + 53) \div (x - 5)$

$$\begin{array}{r} 5 \overline{) 1 \ 0 \ -25 \ -10 \ 53} \\ \underline{\downarrow 5 \ 25 \ 0 \ -50} \\ 1 \ 5 \ 0 \ -10 \ : 3 \end{array}$$

$$x^3 + 5x^2 - 10 + \frac{3}{x-5}$$

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

31) $(2n^4 - 27n^3 + 76n^2 + 44n + 9) \div (n - 9)$

$$\begin{array}{r} 9 \overline{) 2 \ -27 \ 76 \ 44 \ 9} \\ \underline{\downarrow 18 \ -81 \ -45 \ -9} \\ 2 \ -9 \ -5 \ -1 \ : 0 \end{array}$$

yes

State the possible rational roots for each equation.

32) $25x^8 - 34x^4 + 9 = 0$

$P(9) = \pm 1, \pm 3, \pm 9$
 $Q(25) = \pm 1, \pm 5, \pm 25$

$$P/Q = \pm 1, \pm \frac{1}{5}, \pm \frac{1}{25}, \pm 3, \pm \frac{3}{5}, \pm \frac{3}{25}, \pm 9, \pm \frac{9}{5}, \pm \frac{9}{25}$$

Factor each. One factor has been given.

33) $2x^3 - 3x^2 - 17x + 30 = 0; x - 2$

$$\begin{array}{r} 2 \overline{) 2 \ -3 \ -17 \ 30} \\ \underline{\downarrow 4 \ 2 \ -30} \\ 2 \ 1 \ -15 \ : 0 \end{array}$$

$$2x^2 + x - 15 = 0$$

~~$$\begin{array}{r} -30 \\ 6 \times -5 \\ 1 \end{array}$$~~

	$x + 3$
$2x$	$2x^2 + 6x$
-5	$-5x - 15$

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

Find all roots. One root has been given.

34) $3x^3 - 23x^2 + 54x - 40 = 0; 2$

$$\begin{array}{r} 2 \overline{) 3 \ -23 \ 54 \ -40} \\ \underline{\downarrow 6 \ -34 \ 40} \\ 3 \ -17 \ 20 \ : 0 \end{array}$$

$$3x^2 - 17x + 20 = 0$$

~~$$\begin{array}{r} 60 \\ -12 \times -5 \\ -17 \end{array}$$~~

	$x - 4$
$3x$	$3x^2 - 12x$
-5	$-5x + 20$

$$(3x-5)(x-4) = 0$$

$$3x-5=0 \quad x-4=0$$

$$3x=5 \quad x=4$$

$$x = \frac{5}{3} \quad x = 2$$

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

35) $-4, 1, -3$

$$\begin{array}{l} (x+4)(x-1)(x+3) \\ (x+4)(x^2+2x-3) \\ x^3+2x^2-3x \\ + \quad 4x^2+8x-12 \\ \hline y = x^3 + 6x^2 + 5x - 12 \end{array}$$

36) $4, -3i + 3i$

$$\begin{array}{l} (x-4)(x+3i)(x-3i) \\ (x-4)(x^2+3ix-3ix-9i^2) \\ (x-4)(x^2+9) \\ -4 \end{array}$$

$$y = x^3 - 4x^2 + 9x - 36$$