

Review Chapter 4A

Date _____ Period _____

Simplify each expression. Write your answer in standard form.

1) $(-8x - 7x^3 - 4x^2) + (-7x^3 + 7x^2 + 2x)$

$$-11x^3 - 10x^2$$

2) $(-8 - 2x + x^3) + (7 - 7x^3 - 5x)$

$$-6x^3 - 7x - 1$$

3) $(v^3 + 2v^2 + 8v) + (3v - 4v^2 - 2v^3)$

$$-v^3 - 2v^2 + 11v$$

4) $(n^4 + 3n - 7n^2) + (4n^4 + 8n^2 + 4n)$

$$-3n^4 - 15n^2 - n$$

Simplify. Your answer should contain only positive exponents.

5) $4p^3q^{-2}r^{-3} \cdot 4p^3r^{-1}$

$$16p^6q^{-2}r^{-4} = \frac{16p^6}{q^2r^4}$$

7) $2yx^3 \cdot (2x^3y^3)^3$

$$2^3x^9y^9 = 16y^9x^{12}$$

9) $\left(\frac{y^2 \cdot x^{-4} \cdot y^{-2}}{2yx^{-4}}\right)^{-3} = \left(\frac{2yx^{-4}}{y^2 \cdot x^{-4} \cdot y^{-2}}\right)^3$

$$= (2y)^3 = 8y^3$$

6) $2zx^{-1}y^4 \cdot x^2z^3 \cdot x^{-4}z^3$

$$2z^7x^{-3}y^4 = \frac{2z^7y^4}{x^3}$$

8) $(u^3v^{-1})^{-2} \cdot 2uv^2$

$$u^{-6}v^2 \cdot 2u^{-5}v^{-4} = \frac{2v^{-2}}{u^{11}}$$

10) $\left(\frac{2xy \cdot x^{-2}y^{-2}}{2xy^{-1}}\right)^3$

$$= \left(\frac{1}{x^2}\right)^3 = \frac{1}{x^6}$$

Find each product.

11) $2x(8x^2 + 8xy + 4y^2)$

$$16x^3 + 16x^2y + 8xy^2$$

12) $8b^2(7a^2 + 2ab + b^2)$

$$56b^2a^2 + 16b^3a + 8b^4$$

13) $(2x - 3)(4x - 4)$

$$8x^2 - 20x + 12$$

14) $(4p - 4)(4p - 8)$

$$16p^2 - 48p + 32$$

15) $(5m - n)(3m^2 + 7mn + 4n^2)$

$$15m^3 + 32m^2n + 13mn^2 - 4n^3$$

16) $(6u - 6v)(2u^2 - 3uv - 5v^2)$

$$12u^3 - 30u^2v - 12uv^2 + 30v^3$$

Use long division or synthetic division to divide

17) $(10r^3 + 26r^2 - 78r - 54) \div (10r + 6)$

$$\begin{array}{r} r^2 + 2r - 9 \\ 10r+6 \overline{) 10r^3 + 26r^2 - 78r - 54} \\ \underline{-10r^3 + 6r^2} \\ 20r^2 - 78r \\ \underline{-20r^2 + 12r} \\ -90r - 54 \\ \underline{-90r - 54} \\ 0 \end{array}$$

$$r^2 + 2r - 9$$

18) $(10x^4 - 53x^3 - 65x^2 - 76x + 26) \div (10x - 3)$

$$\begin{array}{r} x^3 - 5x^2 - 8x - 10 \\ 10x-3 \overline{) 10x^4 - 53x^3 - 65x^2 - 76x + 26} \\ \underline{-10x^4 + 3x^3} \\ -50x^3 - 65x^2 \\ \underline{+50x^3 + 15x^2} \\ -80x^2 - 76x \\ \underline{+80x^2 + 24x} \\ -100x + 26 \\ \underline{+100x - 30} \\ -4 \end{array}$$

$$x^3 - 5x^2 - 8x - 10 - \frac{4}{10x+3}$$

19) $(b^3 + 16b^2 + 54b - 63) \div (b + 7)$

$$\begin{array}{r} -7 \overline{) 1 \quad 16 \quad 54 \quad -63} \\ \underline{-7 \quad -63 \quad -63} \\ 1 \quad 9 \quad -9 \quad 0 \end{array}$$

$$b^2 + 9b - 9$$

20) $(v^5 - 16v^4 + 70v^3 - 104v^2 + 48v - 80) \div (v - 10)$

$$\begin{array}{r} 10 \overline{) 1 \quad -16 \quad 70 \quad -104 \quad 48 \quad -80} \\ \phantom{10 \overline{) }} 10 \quad -60 \quad +100 \quad -40 \quad 80 \\ \hline 1 \quad -6 \quad 10 \quad -4 \quad 8 \quad 0 \end{array}$$

$$v^4 - 6v^3 + 10v^2 - 4v + 8$$

21) $(3b^4 + 11b^3 + 16b^2 + 25b - 21) \div (b + 3)$

$$\begin{array}{r} -3 \overline{) 3 \quad 11 \quad 16 \quad 25 \quad -21} \\ \underline{-9 \quad -6 \quad -30 \quad 15} \\ 3 \quad 2 \quad 10 \quad -5 \quad -6 \\ \hline 3b^3 + 2b^2 + 10b - 5b - 6 \end{array}$$

22) $(n^4 + 2n^3 + 10n + 24) \div (n + 2)$

$$\begin{array}{r} -2 \overline{) 1 \quad 2 \quad 0 \quad 10 \quad 24} \\ \underline{-2 \quad 0 \quad 0 \quad -20} \\ 1 \quad 0 \quad 0 \quad 10 \quad 4 \\ \hline n^3 + 10 + \frac{4}{n+2} \end{array}$$

State the degree and leading coefficient and describe the end behavior of each function.

23) $f(x) = 3x^3 - 2x^2 + 6x - 8$

D: 3 $x \rightarrow +\infty \quad f(x) \rightarrow +\infty$
 $x \rightarrow -\infty \quad f(x) \rightarrow -\infty$
 L.C.: 3

24) $f(x) = x^5 - 4x^4 + 2x^7 - 9$

D: 7 $x \rightarrow +\infty \quad f(x) \rightarrow +\infty$
 $x \rightarrow -\infty \quad f(x) \rightarrow -\infty$
 L.C.: 2

25) $f(x) = -9x^3 - 8x^5 + 2x^2 - 8$

D: 5 $x \rightarrow +\infty \quad f(x) \rightarrow -\infty$
 $x \rightarrow -\infty \quad f(x) \rightarrow +\infty$
 L.C.: -8

26) $f(x) = -x^5 + 5x^2 - 2x + 12$

D: 5 $x \rightarrow +\infty \quad f(x) \rightarrow -\infty$
 $x \rightarrow -\infty \quad f(x) \rightarrow +\infty$
 L.C.: -1

Evaluate each function.

27) $h(x) = -2|x| + 2$; Find $h(5)$

$h(5) = -2|5| + 2 = -8$

29) $g(x) = |2x - 1| - 3$; Find $g(x - 1)$

$g(x-1) = |2(x-1) - 1| - 3 = |2x - 3| - 3$

31) $f(x) = x^3 + x$; Find $f(\frac{x}{2})$

$f(\frac{x}{2}) = (\frac{x}{2})^3 + \frac{x}{2} = \frac{x^3}{8} + \frac{x}{2}$

28) $h(x) = x^2 + 5x$; Find $h(-2)$

$h(-2) = (-2)^2 + 5(-2) = -6$

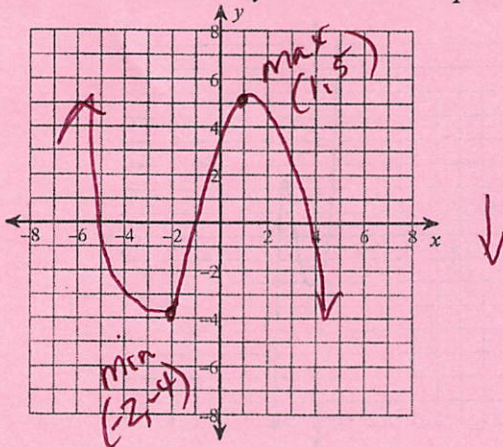
30) $w(n) = -3n^2 + 2$; Find $w(n + 3)$

$w(n+3) = -3(n+3)^2 + 2 = -3(n^2 + 6n + 9) + 2 = -3n^2 - 18n - 25$

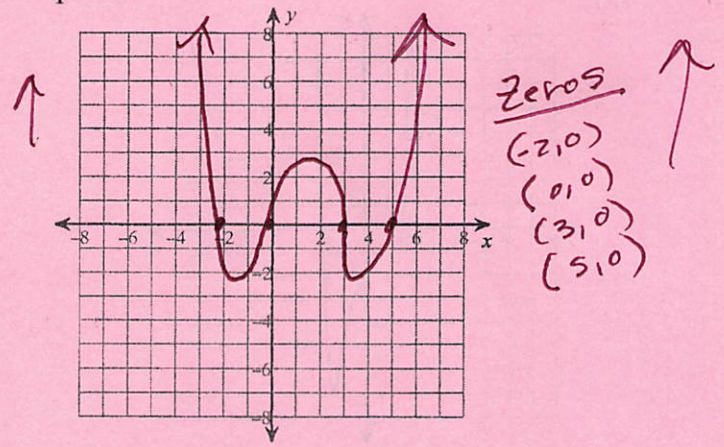
32) $h(a) = 2a^3 + 5a$; Find $h(a^2)$

$h(a^2) = 2(a^2)^3 + 5(a^2) = 2a^6 + 5a^2$

33) Sketch the graph of a third-degree polynomial function that has a negative leading coefficient, a relative maximum at $x = 1$ and a relative minimum at $x = -2$ and three zeros. Identify each of these points.



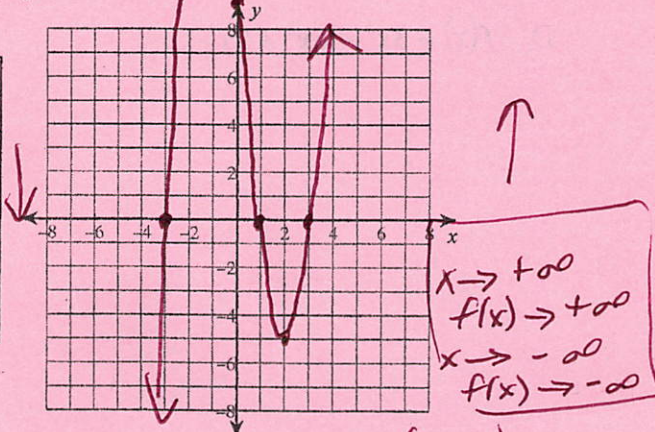
34) Sketch the graph of a fourth-degree polynomial function that has a positive leading coefficient and four zeros at $x = -2, x = 0, x = 3$ and $x = 5$. Identify each of these points.



Use the table of values to sketch the graph. State the number of real zeros. Approximate each zero to the nearest tenth. Approximate the relative minima and relative maxima to the nearest tenth. Describe the end behavior.

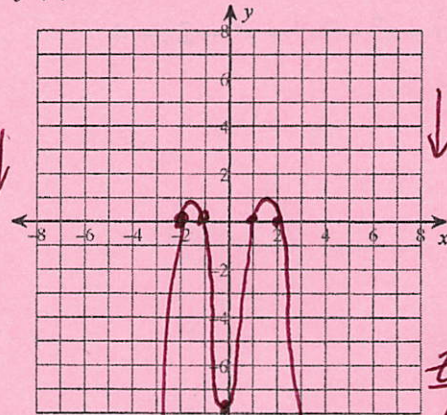
35) $f(x) = x^3 - x^2 - 9x + 9$

x	f(x)
-3	0
-2	15
-1	16
0	9
1	0
2	-5
3	0



Zeros: $(-3, 0), (1, 0), (3, 0)$
 max: $(-1, 16)$
 min: $(2, -5)$

36) $f(x) = -2x^4 + 10x^2 - 8$



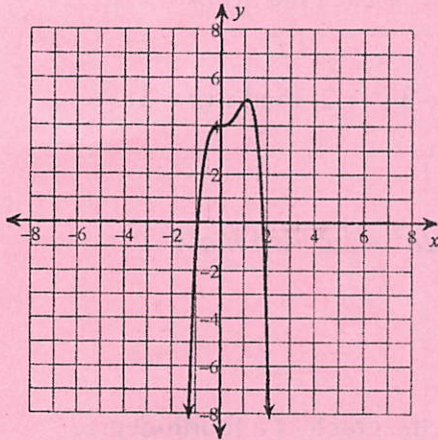
x	f(x)
-3	-80
-2	0
-1	0
0	-8
1	0
2	0
3	-80

Zeros: $(-2, 0), (-1, 0), (1, 0), (2, 0)$
 max: $(-1.5, 1)$
 min: $(1.5, 1)$

Match the equation to the graph.

37)

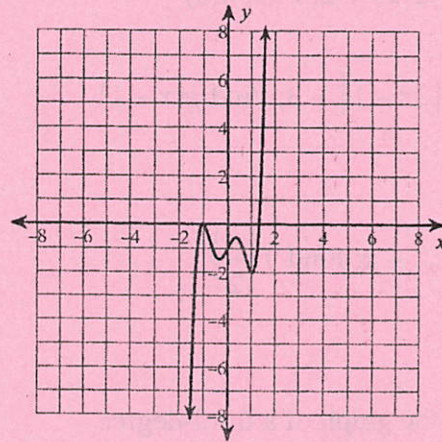
even
neg



A

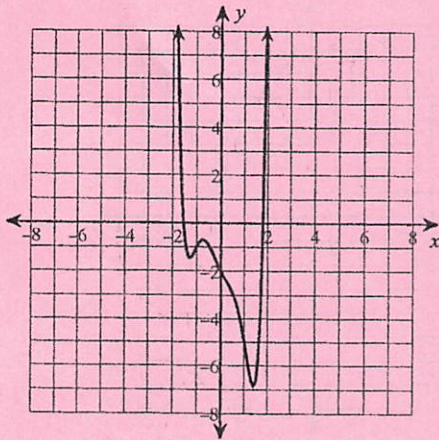
38)

D



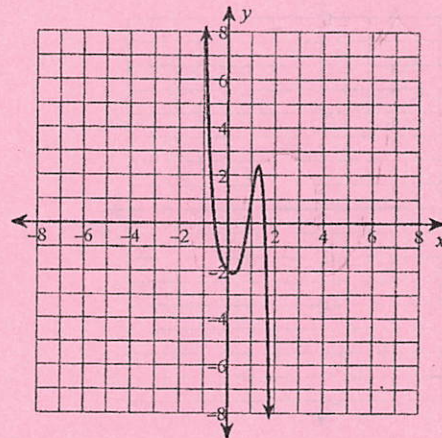
odd
pos

39)



C
even
pos

40)



B

odd
neg

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

B $f(x) = -4x^5 + 6x^4 + 2x^2 - x + 4$

C $f(x) = x^6 - 3x^4 + x^2 - 2x + 4$

D $f(x) = 3x^5 - 6x^3 + 2x - 1$