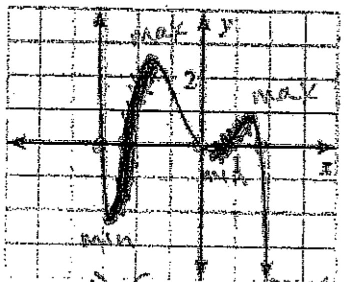
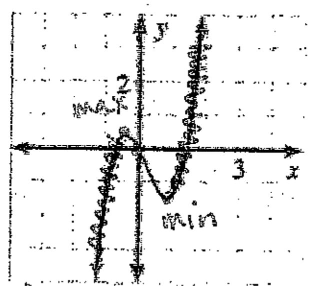
Unit 3 Review Key

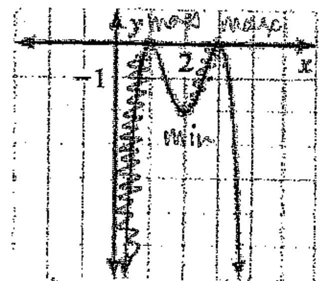
p.52

1. Look at the graphs below and answer the following:

a) What is the degree?
b) How many zeros does the function have?
c) Describe the end behavior
d) State the interval(s) where the function is increasing
e) ~~Circle~~ Label any extrema







a) 5
b) 5
c) $x \to \infty$ $y \to -\infty$
$x \to -\infty$ $y \to \infty$
d) $(-2.8, -1.5) \cup (.5, 1.5)$

a) 3
b) 3
c) $x \to \infty$ $y \to \infty$
$x \to -\infty$ $y \to -\infty$
d) $(-\infty, .5) \cup (1, \infty)$

a) 4
b) 4, 2 m2
c) $x \to \infty$ $y \to -\infty$
$x \to -\infty$ $y \to -\infty$
d) $(-\infty, 1) \cup (2, 3)$

2. Which polynomial function has zeros at 5, –4, and –3 ? $\Longrightarrow$ factors

a. $f(x) = x^3 - 60x^2 + 2x - 23$

b. $f(x) = x^3 + 2x^2 - 23x + 7$

c. $f(x) = x^3 - 17x^2 - 420x + 7$

d. $f(x) = x^3 + 2x^2 - 23x - 60$

$(x-5)(x+4)(x+3)$
$(x-5)(x^2+7x+12)$
x^3+7x^2+12x
$-5x^2-35x-60$
$x^3+2x^2-23x-60$

3. Find the zeros of $f(x) = (x + 2)^6(x + 3)^4$ and state the multiplicity.

a. –2, multiplicity 6; 4, multiplicity –3

b. –2, multiplicity 6; –3, multiplicity 4

c. 6, multiplicity –2; –3, multiplicity 4

d. 6, multiplicity –2; 4, multiplicity –3

4. Divide $-x^3 + 4x^2 - x - 3$ by $x + 2$.

a. $-x^2 + 6x - 13$

b. $-x^2 + 2x + 11$, R –29

c. $-x^2 + 2x + 11$

d. $-x^2 + 6x - 13$, R 23

−2	−1	4	−1	−3
	↓	2	−12	26
	−1	6	−13	23

5. Divide $(x^4 + 12x^3 - 91x^2 + 26x + 20) \div (x - 5)$

a. $x^3 + 17x^2 - 6x - 4$

b. $x^3 - 22x^2 - 79x + 34$

c. $x^3 + 12x^2 - 22x + 34$

d. $x^3 - 6x^2 - 4x + 17$

5	1	12	−91	26	20
	↓	5	85	−30	−20
	1	17	−6	−4	0

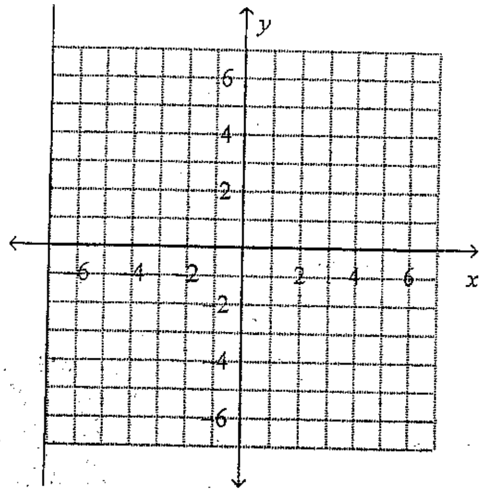
x^3+17x^2-6x-4

38

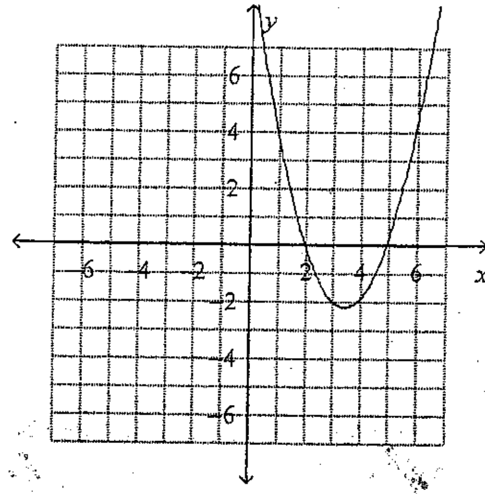
6. Find the zeros of $y = x(x-5)(x-2)$. Then graph the equation. p.53

0, 5, 2

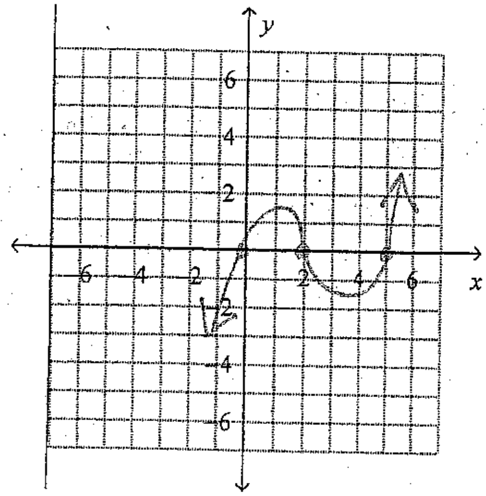
a. 5, 2, –5



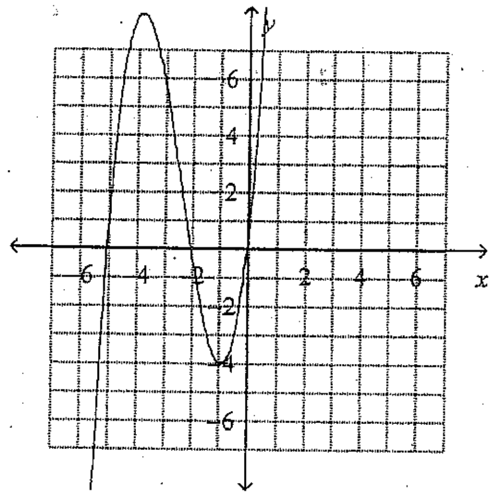
c. 5, 2



b. 0, 5, 2



d. 0, –5, –2



7. Determine which binomial is a factor of $-2x^3 + 14x^2 - 24x + 20$. $= y_1$

a. $x + 5$ b. $x + 20$ c. $x - 24$ d. $x - 5$

Graph.
Look for x intercepts.
$x = 5 \Rightarrow (x-5)$
root factor
Table

x	y
5	0

Find the roots of the polynomial equation

8. $x^3 - 2x^2 + 10x + 136 = 0$

a. $-3 \pm 5i, -4$

c. $-3 \pm i, 4$

b. $3 \pm 5i, -4$

d. $3 \pm i, 4$

$$\begin{array}{r|rrrr} -4 & 1 & -2 & 10 & 136 \\ & \downarrow & -4 & 24 & -136 \\ \hline & 1 & -6 & 34 & \boxed{0} \end{array}$$

$x^2 - 6x + 34$

$$x = \frac{6 \pm \sqrt{36 - 4(1)(34}}{2}$$

$$= \frac{6 \pm \sqrt{36-136}}{2}$$

$6 \pm \sqrt{-100}$

$$\frac{6 \pm 10i}{2}$$

$3 \pm 5i.$

39

(p.54)

9. $2x^3 + 2x^2 - 19x + 20 = 0$

a. $\frac{3+i}{2}, \frac{3-i}{2}, -4$

c. $\frac{-3+i}{2}, \frac{-3-i}{2}, -4$

b. $\cancel{\frac{-3+2i}{2}, \frac{-3-2i}{2}, 4}$

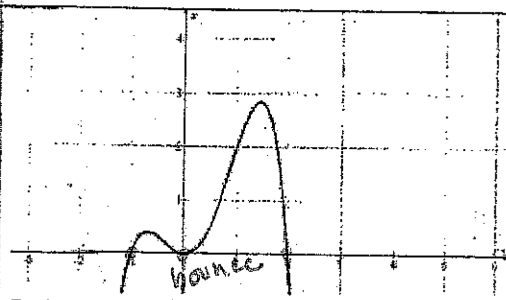
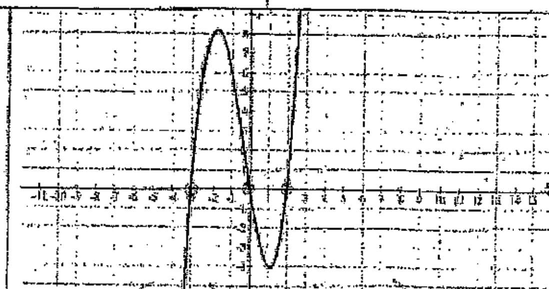
d. $\cancel{\frac{3+2i}{2}, \frac{3-2i}{2}, 4}$

$$\begin{array}{r|rrrr} -4 & 2 & 2 & -19 & 20 \\ & \downarrow & -8 & 24 & -20 \\ \hline & 2 & -6 & 5 & 0 \end{array}$$

$2x^2 - 6x + 5 = 0$

$X = \frac{6 \pm \sqrt{36-4(2)(5)}}{2(2)} = \frac{6 \pm \sqrt{36-40}}{4} = \frac{6 \pm \sqrt{-4}}{4} = \frac{6 \pm 2i}{4} = \frac{3 \pm i}{2}$

10. Complete the following table

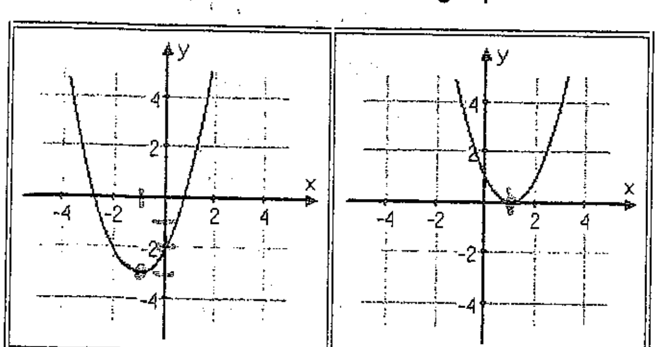
Convert factors to roots	$(x+5)=0$ $X=-5$	$(x-3)=0$ $X=3$	$(2x+8)=0$ $2x=-8$ $X=-4$
Convert the roots to factors	$X=7$ $(X-7)$	$X=-9$ $(X+9)$	$X=1/3$ $3x=1$ $3x-1=0$ $(3x-1)$
Identify the FACTORS of the roots shown in the graph	 bounce Factors: $(x+1)(x)^2(x-2)$		 Factors: $(x+3)(x)(x-2)$
Multiplicity of the functions graphed above	Root x = 0, multiplicity = 2 Root x = -1, multiplicity = 1 Root x = 2, multiplicity = 1		Root x = -3, multiplicity = 1 Root x = -1, multiplicity = 1 Root x = 2, multiplicity = 1
Multiplicity of the each root in the function	$(x-3)^2(x+1)(x-2)^3$ Root: x = 3, multiplicity = 2 X = -1, multiplicity = 1 X = 2, multiplicity = 3		$(x-4)(x)(x+3)^5$ Root: x = 4, multiplicity = 1 X = 0, multiplicity = 1 X = -3, multiplicity = 5

11. Write an equation for the transformation of x^3 three units left $(x+3)$, two units up $+2$ and reflected across the x-axis $-$

$y = -(x+3)^3 + 2$

12. Write an equation for each graph below as a transformation from $y = x^2$

left 1
down 3



right 1

$y = (x+1)^2 - 3$

$y = (x-1)^2$

40

(p.56)

3. Given the graph below state the following information:

Zeroes: $\{-2, 1, 1\}$ Degree: 3 # of turns: 3

Relative Maximum: $(1, 0)$ Relative Minimum: $(-1, -4)$

Absolute Maximum: ∞ Absolute Minimum: $-\infty$

End behavior: $x \to \infty$ $y \to -\infty$ $x \to -\infty$ $y \to \infty$

Decreasing Interval(s): $(-\infty, -1) \cup (1, \infty)$ Increasing Interval(s): $(-1, 1)$

Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$

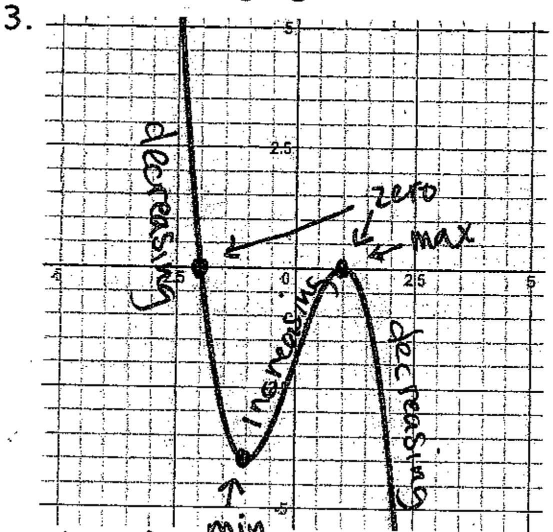
Real zeroes: $-2, 1, 1$ Imaginary zeroes: none

Write the equation in factored form: $f(x) = -(x+2)(x+1)^2$

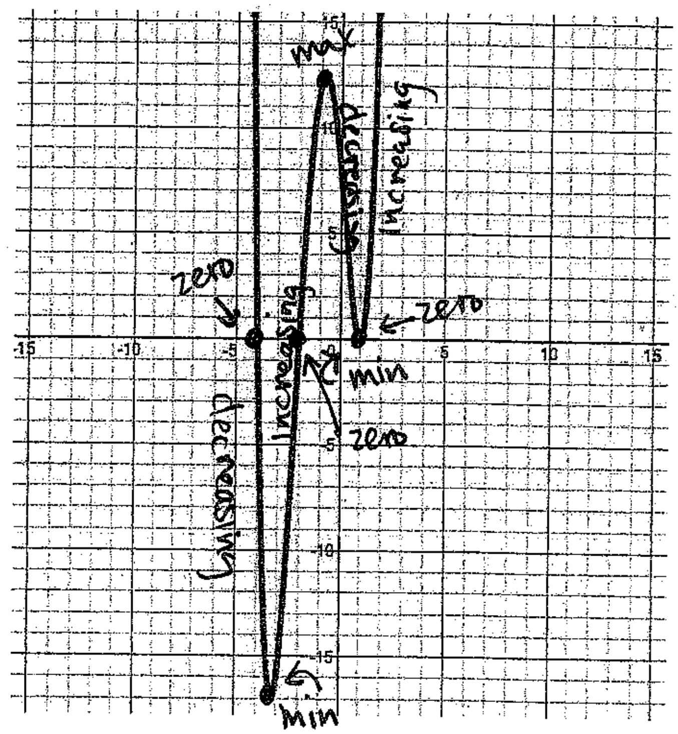
Write the equation in standard form: $f(x) = -x^3 - 4x^2 - 5x - 2$

Scale = .5

3.



4.



$(x^2+2x+1)(x+2)$

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

$-1(x^3+4x^2+5x+2)$

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

4. Given the graph below state the following information:

Zeroes: $\{-4, -2, 1, 1\}$ Degree: 4 # of turns: 4

Relative Maximum: $(-1, 12)$ Relative Minimum: $(-4, -17)$ $(1, 0)$

Absolute Maximum: ∞ Absolute Minimum: $(-4, -17)$

End behavior: $x \to \infty$ $y \to \infty$ $x \to -\infty$ $y \to \infty$

Decreasing Interval(s): $(-\infty, -4) \cup (-1, 1)$ Increasing Interval(s): $(-4, -1) \cup (1, \infty)$

Domain: $(-\infty, \infty)$ Range: $(-17, \infty)$

Real zeroes: $\{-4, -2, 1, 1\}$ Imaginary zeroes: none

Write the equation in factored form: $f(x) = (x+4)(x+2)(x-1)^2$

Write the equation in standard form: $f(x) = x^4 + 4x^3 - 3x^2 - 10x + 8$

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

$(x^2+6x+8)(x^2-2x+1)$

$x^4 - 2x^3 + x^2 + 6x^3 - 12x^2 + 6x + 8x^2 \ldots$

14