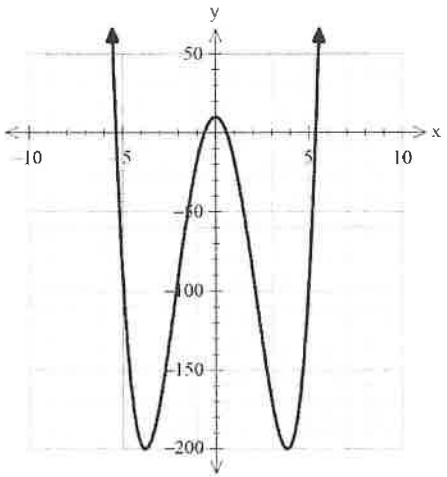
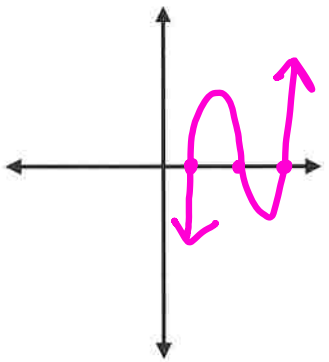
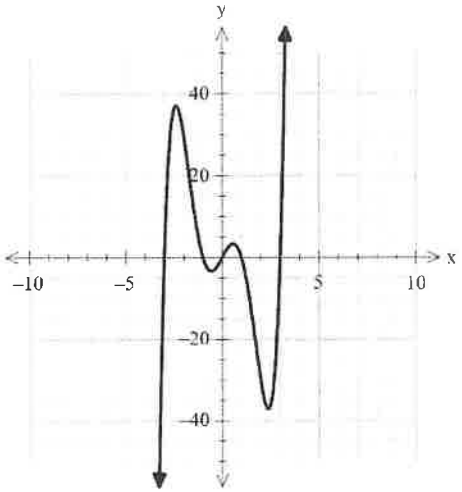
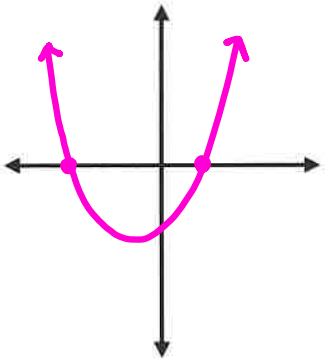
Lesson 2-2

Solving Polynomial Equations

Directions: Fill in the missing cells of the table.

Function	$g(x) = x^4 - 29x^2 + 10$	$f(x) = x^3 - 9x^2 + 24x - 18$	$z(x) = x^5 - 10x^3 + 9x$	$w(x) = x^2 + 4x - 12$
Graph		Sketch a graph: 		Sketch a graph: 
Degree	4	3	5	2

How would you explain the relationship between the equation, graph and degree of a polynomial function?

Lesson 2-2

Solving Polynomial Equations

How many roots should we expect to find?

A polynomial of degree *n* will have *n* roots, some of which may be multiple roots (they repeat).

For example, $x^3 - 9x^2 + 24x - 16 = 0$ is a polynomial of degree 3 (*highest power*) and as such will have 3 roots.

When the powers in polynomial equations increase, it becomes more difficult to find their solutions (roots).

The following statements are different ways of asking the same thing!!

- Solve the polynomial equation $P(x) = 0$.
- Find the roots of the polynomial equation
- Find the zeroes of the polynomial function
- Find the *x*-intercepts of the polynomial function

Exercise #1: Solve $3x^2 - 10x + 3 = 0$ for all value(s) of *x*.

$-9 \cdot \frac{9}{-1}$

$3x^2 - 9x - 1x + 3 = 0$

$3x(x-3) - 1(x-3) = 0$

$(x-3)(3x-1) = 0$

$x = 3 \quad | \quad x = 1/3$

How many roots should we have?

2

Exercise #2: Solve $x^4 - 16x^2 = 0$ for all value(s) of *x*.

$X^2(X^2-16)=0$

$X(X+4)(X-4)=0$

$X^2=0 \mid X=-4 \mid X=4$

$X=0$

↑ Double Root

How many roots should we have?

4

If a polynomial is not factorable, then you will need to use your graphing calculator to solve for the *real* roots.

If a polynomial is not factorable, then you will need to use your graphing calculator to solve for the *real* roots.

Calculator Steps

1.) Graph in Y_1

2.) 2ND > CALC F4 TRACE > 2: zero

← must be in y= form

Exercise #3: Which value, to the *nearest tenth*, is *not* a solution of $x^3 + 3x^2 - 3x - 1 = 3x + 8$

(1) -3.9 ✓

(2) -1.1 ✓

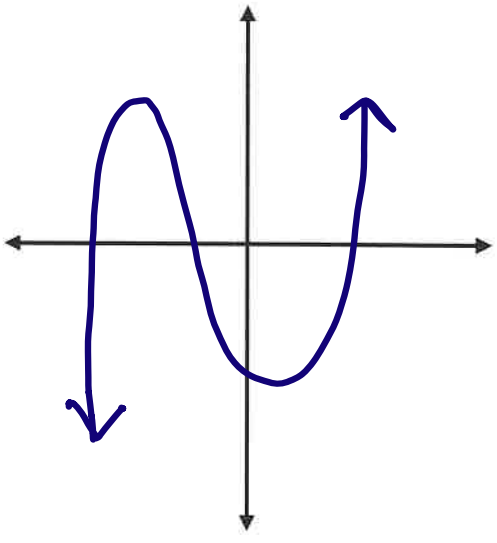
(3) 2.1 ✓

(4) 4.7

$x^3 + 3x^2 - 3x - 1 = 3x + 8$

$-3x - 8 \quad -3x - 8$

$x^3 + 3x^2 - 6x - 9 = 0$



Solving Polynomial Equations Practice

1. Find the zeros of the polynomial equation $2x^3 - 11x^2 + 9x = 0$.

*Scan QR Codes for Answers!

SCAN ME

2. Solve $x^3 - 5x^2 - x + 5 = 0$ for all value(s) of x.

SCAN ME

3. Find the roots of the polynomial equation $x^4 - 29x^2 + 100 = 0$.

SCAN ME

4. Solve algebraically for all values of *x*: $(x-1)^2+5(x-1)+6=0$

5. Find all *x*-intercepts of the function $3x^4+4x^3-34x^2-4x+16$ to the *nearest tenth* when necessary.

6. Find all *x*-intercepts of the function $f(x)=x^3+4x^2-5x-2$ to the *nearest hundredth*.