College Algebra (Math1043)

Exam II-warmup(4 pages)

Note: For various definitions, concepts, or techniques, see the text book.

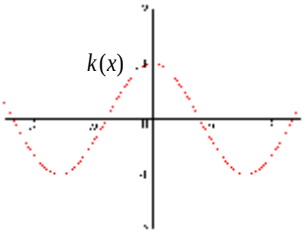
Section 1.6:

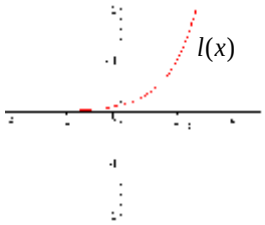
1. Know what a one-to-one function is.

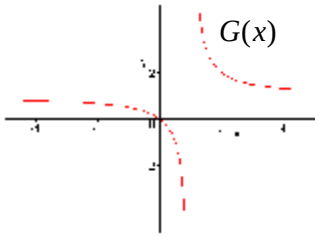
2. Be able to determine whether a function is one-to-one from its graph (Vertical Line Test) or from its equation.

Examples: Which of the following functions are one-to-one?

$$g(x)=\sqrt{x} \quad , \quad h(x)=3x-1 \quad , \quad f(x)=x^2-x-2$$







3. Know what the inverse functions are.

4. Know when a function has an inverse.

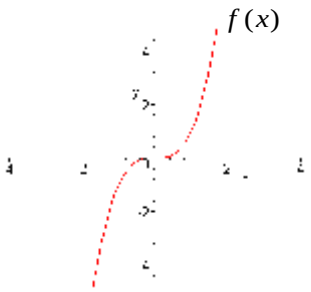
5. Be able to find the inverse function when the equation for the function is given.

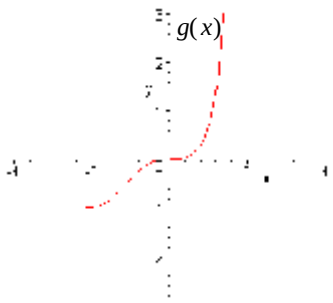
Examples: Find the inverse functions for the functions:

$$f(x)=\frac{x+2}{x-4} \quad , \quad h(x)=3x-1 \quad , \quad g(x)=\sqrt{x} \quad , \quad F(x)=x^2 \ , \ x\geq 0$$

6. Be able to find the graph of the inverse function when the graph of a function is given.

Example: Sketch the graph of the inverse function for the following functions.





Section 2.3

1. Be able to recognize a quadratic functions and know how the graph of a quadratic function looks like.

Examples: Which one of the following function is a quadratic function?

$f(x)=2x^2+x-3$ $\quad g(x)=2x^3-3x^2+2x-3$ $\quad h(x)=\dfrac{x^2-x-2}{x^2-4x+3}$ $\quad k(x)=\sqrt{x^2+23-6}$

$l(x)=\sqrt{x^4+x^2+.25}$

2. Be able to complete square (as discussed in class) to convert the equation of a quadratic function from standard form to vertex form.

Examples: See # 1 through 6 on page 162 of the text book.

Also convert the function $f(x)=3x^2-12x+7$ to vertex form and hence find the coordinates of the vertex.

3. Be able to find the coordinates of vertex, *x*-intercepts, *y*-intercept (both by calculation and by a graphing calculator) and be able to determine whether the graph opens up or down. Also be able to sketch the graph at least by calculators.

Examples: For the following two functions, determine whether the graph opens up or down, then find the *x*-intercept, the *y*-intercept, coordinate of the vertex, and finally sketch the graphs.

$f(x)=x^2-8x+12$, $g(x)=2x^2+x-3$

4. Be able to determine (algebraically as well by a calculator) whether a quadratic function has a minimum or maximum value, and be able to determine at what value of *x* in the domain that maximum or minimum is attained, and how much is the value of that maximum or minimum.

Examples:

i. Determine whether the quadratic functions $f(x)=-x^2-4x+1$ and $g(x)=x^2+2x-3$ have a max or min value In each case find that max or min, and find the values of *x* where the max or min occur. Repeat the problem using a graphing calculator.

ii. The revenue function for selling a product is given by $R(x)=900x-0.1x^2$, where *x* is the number of units sold. Find the number of units that produce the maximum profit. Find that maximum profit.

iii. The cost function for producing a product is given by $C(x)=800-10x+0.25x^2$ where *x* is the number of units produced. How many units must be produced to yield the minimum cost? Find that minimum cost.

5. Be able to do problems similar to the ones assigned as home work.

Section 3.1:

1. Know: what a polynomial is. What is the degree , leading term, leading coefficient, constant term, *y*-intercept, and the zeros (*x*-intercepts). Also know how to determine the maximum number of zeros (*x*-intercepts) and be able to find the zeros either algebraically or graphically. Be able to find the number of turning points. Be able to use a graphing calculator to sketch graphs of polynomials.

Examples: Which of the following functions are polynomials?

$$f(x)=x^3-5x^2+4x \qquad T(x)=\frac{x^2-x-2}{x^2-4x+3} \qquad g(x)=(2x-1)(x+2)(3x+2)(x-4)$$

$$h(x)=2x^3-3x^2+\sqrt{2x-3}$$

Examples: For the functions in the above list which are polynomials, find the degree, leading coefficient, # of zeros, # of turning points. Then find the *y*-intercept and the zeros one way or another.

2. Know what kind of graphs polynomials have and be able to determine the end behavior and to sketch the graph of a polynomial by hand or by a calculator.

Examples: Determine the end behavior of any polynomial on this study guide, then sketch the graphs.

3. Review the assigned problems from this section.

Section 3.2:

1. Know the meaning of the **Location Theorem**, and be able to use that theorem to determine whether a polynomial has a zero in a given interval **or** a polynomial equation has a root in a given interval.

Examples:

i. Show that the following polynomials have at least one **zero** in the given intervals:

$$P(x)=2x^2+x-3\ ,\ [-2,-1] \quad , \quad P(x)=2x^3-3x^2+2x-3\ ,\ [1,2].$$

$$Q(x)=3x^3-11x^2-14x\ ,\ [4,5] \quad , \quad R(x)=5x^3-9x^2-4x+9\ ,\ [-1,2]$$

iii. Let $P(x)$ be a polynomial whose some of its values at various points are given in the table below.

What can you say about the zeros of this polynomial in the given range?

x	-8	-2	0	2	4	9
$P(x)$	-3	1	5	3	-2	25

Section 3.4:

1. Know what a rational function is.

2. Be able to find the domain of a rational function:

3. Know what an asymptote of a rational function is.

   Be able to find the vertical and the horizontal asymptotes of a rational function.

Example:

I. Which of the following functions are rational functions?

$$f(x)=\frac{x^2-x-2}{x^2-4x+3} \quad , \quad f(x)=\frac{x^2+2x-3}{x^3-4x} \quad , \quad f(x)=\frac{2x-1}{x+3} \quad , \quad f(x)=\frac{3x+2}{x^2-4} \quad ,$$

$$f(x)=\frac{x+}{x-}$$

$$h(x)=2x^3-3x^2+\sqrt{2x-3} \quad , \quad g(x)=2x^3-3x^2+2x-3 \quad , \quad T(x)=\frac{x^{-2}-x-2}{x^2-4x^{-1}+3}$$

$$r(x)=\sqrt{\frac{x}{x}}$$

II. For those functions in the above lis which are rational function, Find the domain, the vertical and the horizontal asymptotes , x-intercepts, y-intercept,

4. Know what kind of graphs rational functions have and be able to determine the end behavior and to sketch the graph
   of a rational function by hand or by a calculator.

Example: Sketch the graphs of functions in the above examples.

Good luck and let us know if we can help