

Math 111  
Exam 2 Review

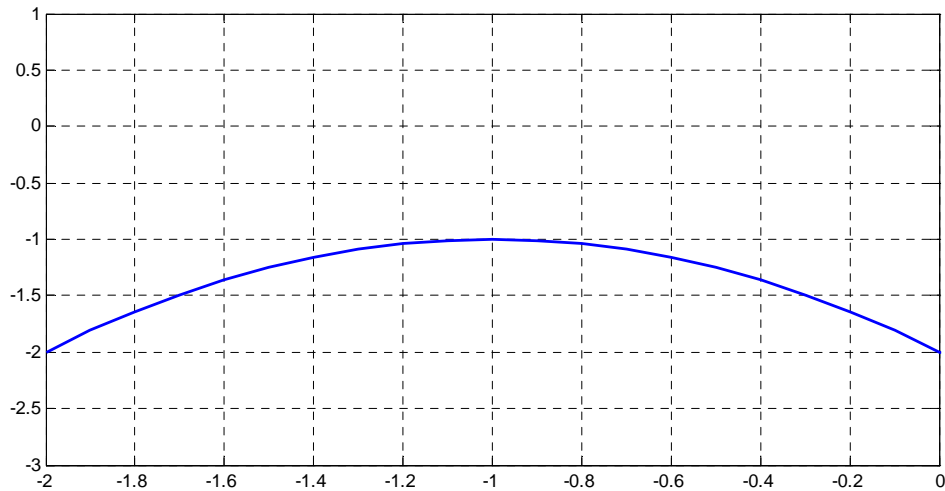
**Quadratic Functions and Models**

1) Write the given expression in the form  $f(x) = a(x - h)^2 + k$ . Identify the vertex.

a)  $f(x) = x^2 - 3x$

b)  $f(x) = 2x^2 - 8x - 1$

2) Use the graph of the quadratic function  $f$  to write the formula as  $f(x) = a(x - h)^2 + k$ .



**Transformations of Functions:**

3) Write a formula for a function  $g$  whose graph is similar to  $f(x)$  but satisfies the given conditions. Do not simplify the formula.

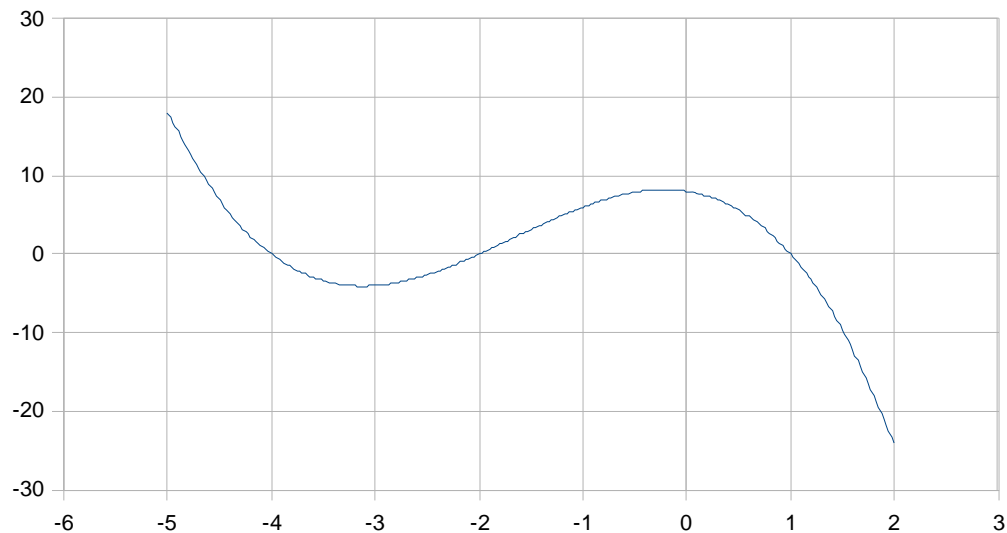
$$f(x) = -x^3 + 2x^2 - 4$$

- a) Shifted 3 units to the left.
- b) shifted downward 4 units
- c) Rotated across the x-axis
- d) rotated across y-axis

## 4.1 Nonlinear functions and their graphs:

### 1. Increasing and Decreasing/Absolute Extrema

Assume the graph of  $f(x)$  is given below (assume closed intervals)



Estimate the intervals for  $f(x)$  where it is:

1. increasing
2. decreasing

1. Estimate all values of the :

1. local maximum:
2. absolute maximum:
3. local minimum:
4. absolute minimum:

2. Even and Odd Functions-Determine if  $f$  is even, odd, or neither and explain why

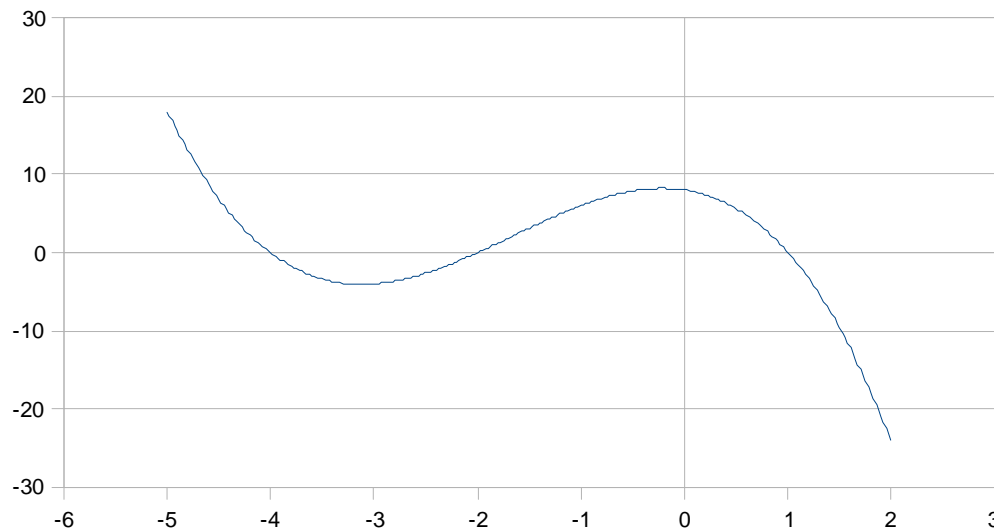
a.  $f(x) = 2x - 1$

b.  $f(x) = 8 - 2x^2$

c.  $f(x) = -x^5$

## 4.2 Graphs of Polynomials

Let the graph of  $f(x)$  be described as:



**Minimum degree**

- a. How many critical points does  $f(x)$  have?
- b. How many  $x$ -intercepts does  $f(x)$  have ?
- c. What is the minimal degree of  $f(x)$

2. Predict the end behavior of :

a.  $f(x) = -x^5 + 2x^2$

b.  $f(x) = -8x^8 - 16$

### 4.3 Real Zeros of Polynomial Functions

1. Dividing the expression:

a.  $\frac{(x^2 - 5x)}{5x}$

b.  $\frac{(3x^4 - 7x^3 + 6x - 16)}{(3x - 7)}$

c.  $\frac{(x^5 + 3x^4 - x - 3)}{(x + 3)}$

2. Use the remainder theorem to find the remainder when

$f(x) = x^4 - 2x^3 - 13x^2 - 10x$  is divided by  $(x-2)$

3. Find the complete factorization of  $f(x) = -4x^3 - x^2 + 51x - 36$  given that  $k=-4$  is a zero

