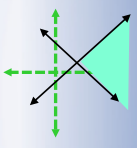
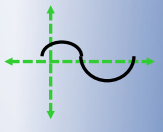
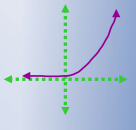
$5x-2y \leq 75$



$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$



$S = Pe^{rt}$



$APY = (1+\frac{r}{n})^{n}-1$

Math 1090 ~ Business Algebra

Section 3.4 Polynomial Functions

Objectives:

- Determine the degree of a polynomial function and find the coefficients, the leading coefficient and the constant.
- Write a polynomial function in descending order.
- Sketch a variety of general polynomial functions, even and odd.
- Find the zeros or roots of a polynomial function.

Polynomial Function

$f(x) = a_n x^n + a_{n-1}x^{n-1} + \ldots + a_2x^2 + a_1x + a_0$

Example

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

Degree

highest power of x

4

Coefficients

numbers multiplied by x terms

coeff. of x^4 is 4
" " x^3 is -2
" " x^2 is 0
" " x is 3

Leading coefficient

coefficient of highest power of x

8

Constant

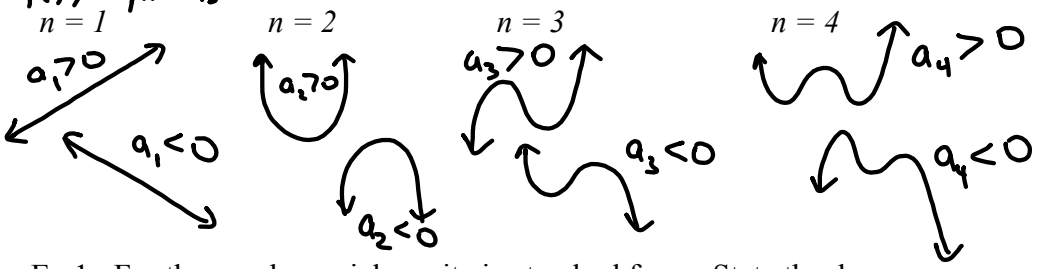
number that doesn't have x in it

-1

Graphs

$f(x) = a_2x^2 + a_1x + a_0$

$f(x) = a_1x + a_0$



Ex 1: For these polynomials, write in standard form. State the degree, leading coefficient and show the general shape of each.

a) $f(x) = 4x - 12 - 2x^3 - x^2$

standard form (descending order)

$f(x) = -2x^3 - x^2 + 4x - 12$

degree = 3

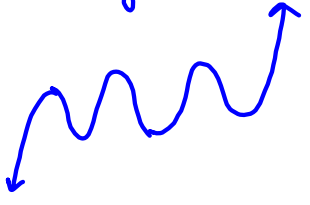
leading coefficient = -2

b) $f(x) = 3x^7 - 14x + 3x^2 - 4x^4 - 5$

$f(x) = 3x^7 - 4x^4 + 3x^2 - 14x - 5$

degree = 7

leading coeff. = 3



Ex 2: For these polynomials, answer the following.

a) Degree

b) zeros

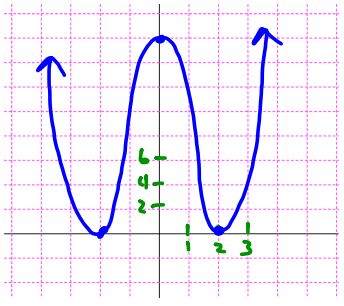
c) y-intercept

d) x-intercept

e) sketch the graph

A) $f(x) = x^4 - 8x^2 + 16$

general shape:



$f(x) = x^4 - 8x^2 + 16$

(a) degree = 4

(b) zeros:

(x-values where $y = 0$)

$0 = x^4 - 8x^2 + 16$

$0 = (x^2 - 4)(x^2 - 4)$

$0 = (x^2 - 4)^2$

$\sqrt{0} = \sqrt{(x^2-4)^2}$

$0 = (x^2 - 4)$

$4 = x^2$

$x = \pm 2$

(c) y-intercept:

$f(x) = x^4 - 8x^2 + 16$

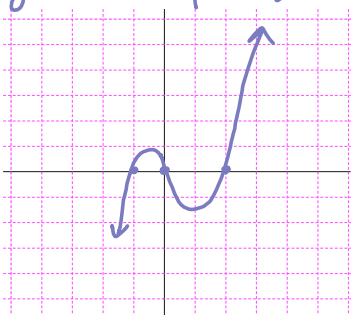
(0, 16) $f(0) = 16$

(d) x-intercept(s):

(2, 0) (-2, 0)

B) $g(x) = 2x^3 - 2x^2 - 4x$

general shape



$g(x) = 2x^3 - 2x^2 - 4x$

(a) degree = 3

(b) zeros/roots:

$0 = 2x^3 - 2x^2 - 4x$

$0 = 2x(x^2 - x - 2)$

$0 = 2x(x-2)(x+1)$

$2x = 0$ or $x - 2 = 0$ or $x + 1 = 0$

$x = 0, 2, -1$

(c) y-intercept:

(0, 0) $g(0) = 2(0) - 2(0) - 4(0) = 0$

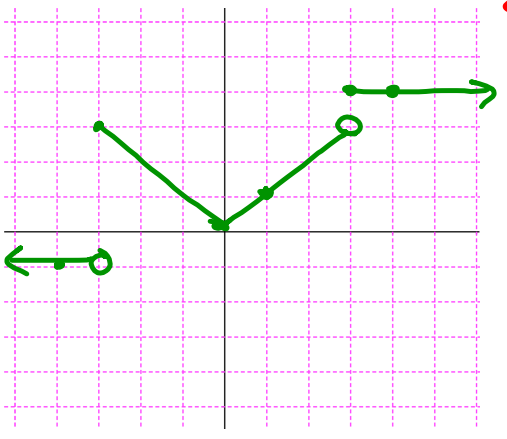
(d) x-intercept(s):

(0, 0), (2, 0), (-1, 0)

Ex 3: For these piecewise functions, fill in the points and sketch the graph.

a) $f(x)=\begin{cases} 4 & x \geq 3 \\ |x| & -3 \leq x < 3 \\ -1 & x < -3 \end{cases}$ ① ② ③

	③	②	②	②	①	①
x	-4	-3	0	1	3	4
y	-1	3	0	1	4	4



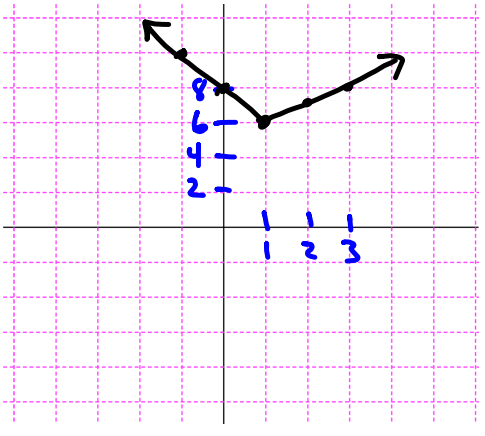
① $y=4$

② $y=|x|$

③ $y=-1$

piecewise fn: a fn defined in pieces

b) $g(x)=\begin{cases} x+5 & x \geq 1 \\ -2x+8 & x < 1 \end{cases}$ ① ②



	x	y
①	1	$1+5=6$
②	0	$-2(0)+8=8$
②	-1	$-2(-1)+8=10$
①	2	$2+5=7$
①	3	$3+5=8$

① $y=x+5$

② $y=-2x+8$ (1, 6)