3. $f(x) = -x^4 + 4x^3 - x^2 - 6x$

Degree	4
Leading Coefficient	neg.
End Behaviour	Start low, end low
Zeros/x-intercepts	(0,0) (-1,0) (2,0) (3,0)
y-intercept	(0,0)
Interval(s) where the function is positive or negative	$-\ \vert\ +\ \vert\ -\ \vert\ +\ \vert\ -$ $-1\ \ 0\ \ \ 2\ \ 3$

$f(x) = -x(x^3 - 4x^2 + x + 6)$

Potential roots: $\pm 1, \pm 2, \pm 3, \pm 6$

$f(-1) = (-1)^3 - 4(-1)^2 + (-1) + 6$

$= -1 - 4 - 1 + 6$

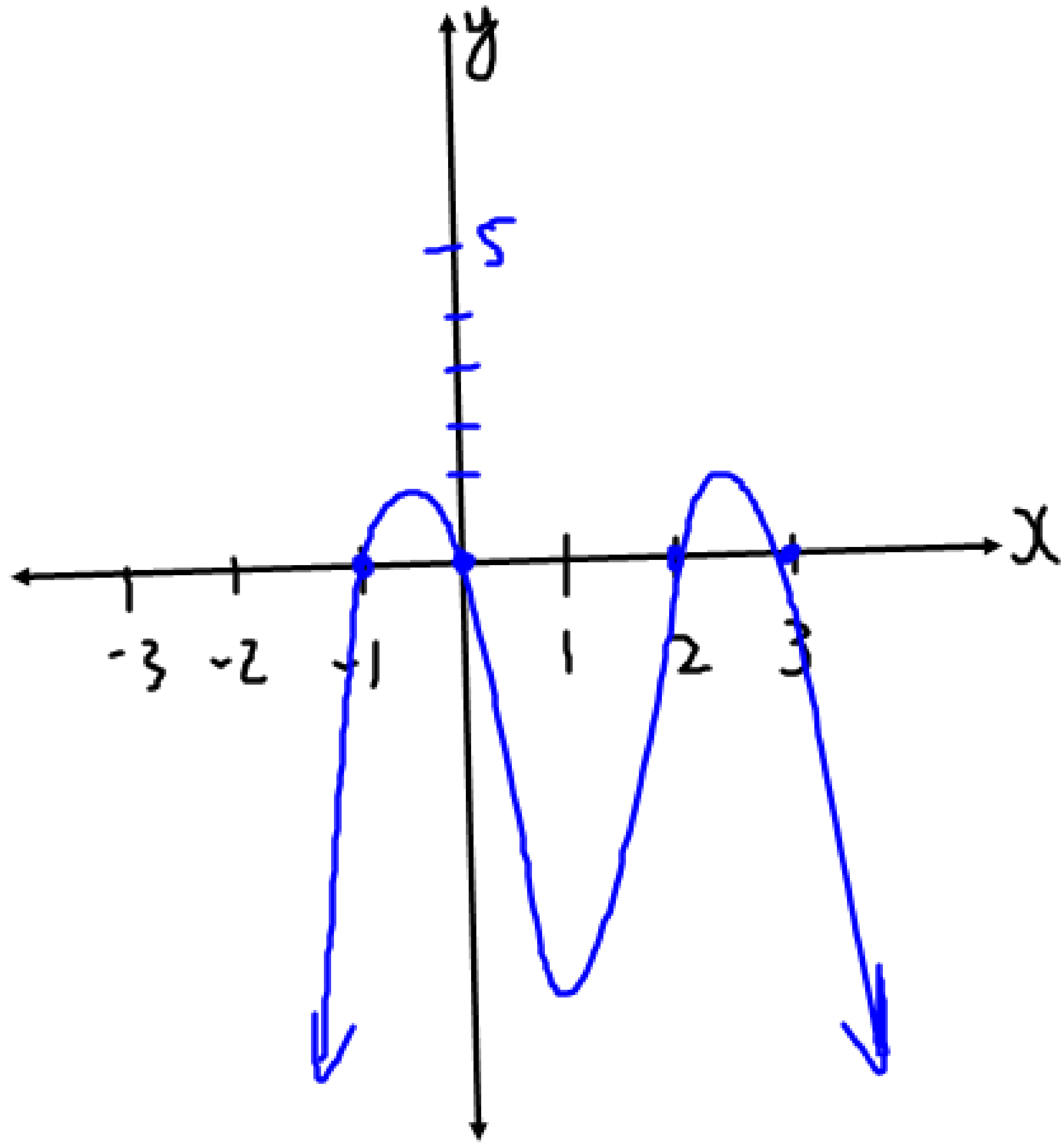
$f(-1) = 0$ $x = -1$ is a root, $x+1$ is factor

$$\begin{array}{r|rrrr} -1 & 1 & -4 & 1 & 6 \\ & \downarrow & -1 & 5 & -6 \\ \hline x & 1 & -5 & 6 & 0 \end{array}$$

$f(x) = -x(x+1)(x^2 - 5x + 6)$

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

P: $x \in (-1, 0) \cup (2, 3)$ N: $x \in (-\infty, -1) \cup (0, 2) \cup (3, \infty)$



y
5
x
-3
-2
-1
1
2
3

4. $f(x) = x^5 + 2x^4 - 6x^3 - 20x^2 - 19x - 6$

Degree	
Leading Coefficient	
End Behaviour	
Zeros/x-intercepts	
y-intercept	
Interval(s) where the function is positive or negative	

Potential Roots $\pm 1, \pm 2, \pm 3, \pm 6$

$P(-1) = (-1)^5 + 2(-1)^4 - 6(-1)^3 - 20(-1)^2 - 19(-1) - 6$

$P(-1) = 0$ $(x+1)$ is a factor

$P(-2) = 0$ $(x+2)$ is a factor

$P(3) = 0$ $(x-3)$ is a factor

$$\begin{array}{r|rrrrrr} -1 & 1 & 2 & -6 & -20 & -19 & -6 \\ & \downarrow & -1 & -1 & 7 & 13 & 6 \\ \hline & 1 & 1 & -7 & -13 & -6 & 0 \end{array}$$

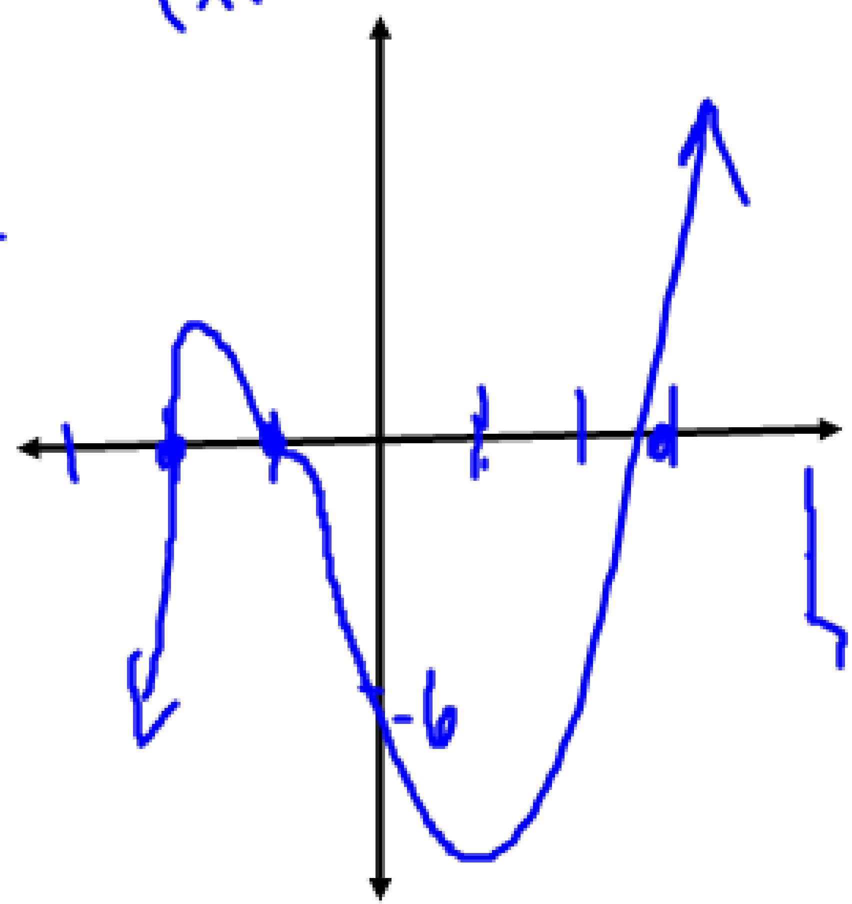
$$\begin{array}{r|rrrrr} -2 & 1 & 1 & -7 & -13 & -6 \\ & \downarrow & -2 & 2 & 10 & 6 \\ \hline & 1 & -1 & -5 & -3 & 0 \end{array}$$

$$\begin{array}{r|rrrr} 3 & 1 & -1 & -5 & -3 \\ & \downarrow & 3 & 6 & 3 \\ \hline & 1 & 2 & 1 & 0 \end{array}$$

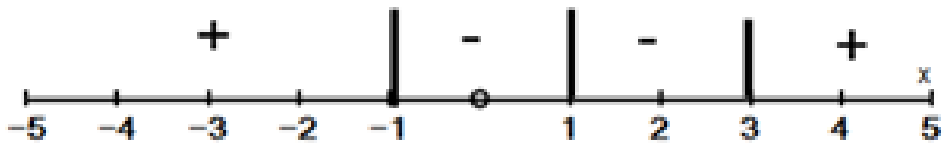
$(x+1)(x+2)(x-3)(x^2+2x+1)$

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

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



The following sign diagram was created from the polynomial $y = f(x)$



Find the interval for which

A) $f(x) > 0$

$x \in (-\infty, -1) \cup (3, \infty)$

B) $f(x) \geq 0$

$x \in (-\infty, -1] \cup [1] \cup [3, \infty)$

tricky

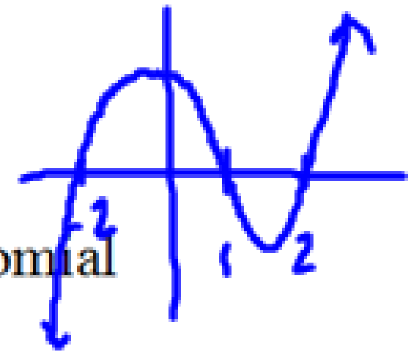
C) $f(x) < 0$

$x \in (-1, 1) \cup (1, 3)$

D) $f(x) \leq 0$

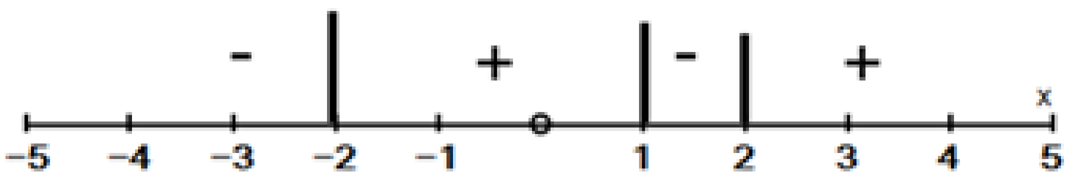
$x \in [-1, 3]$

Equations and Graphs of Polynomials (Day 2)



Sign diagrams and intervals

The following sign diagram was created from the polynomial $y = f(x)$



Find the interval for which

Does not include 0

include 0

A) $f(x) > 0$

$x \in (-2,1) \cup (2,\infty)$

B) $f(x) \geq 0$

$x \in [-2,1] \cup [2,\infty)$

C) $f(x) < 0$

$x \in (-\infty,-2) \cup (1,2)$

D) $f(x) \leq 0$

$x \in (-\infty,-2] \cup [1,2]$

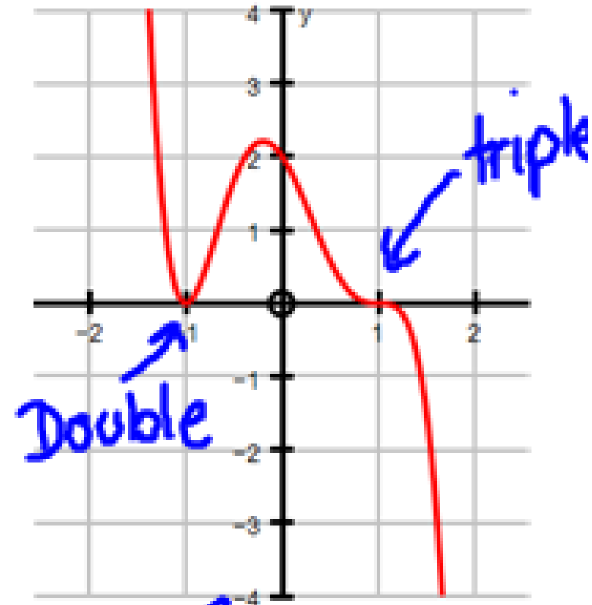
For the polynomial graphed below, determine:

(a) the sign of the leading coefficient negative

(b) the x and y-intercepts $(-1,0)$ $(1,0)$ $(0,2)$

(c) the intervals where the function is positive and the intervals where it is negative

(d) the equation for the polynomial function (in factored and expanded form)



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

use y-int to find "a"

$$2 = a(0+1)^2(0-1)^3$$

$$2 = a(1)(-1)$$

$$-2 = a$$

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

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

$$= -2(x^2-1)(x^2-1)(x-1)$$

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

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

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

Pg. 146

they follow each other

±whole#

Your Turn

Three consecutive integers have a product of −210.

a) Write a polynomial function to model this situation.

b) What are the three integers?

$$(x)(x+1)(x+2)=-210$$

$$(x^2+x)(x+2)=-210$$

$$x^3+2x^2+x^2+2x=-210$$

$$x^3+3x^2+2x+210=0$$

210

7 30

2 15

3 5

$x^3+3x^2+2x+210=0$

$f(-7)=(-7)^3+3(-7)^2+2(-7)+210$

$=-343+147-14+210$

$=0$

$$\begin{array}{r|rrrr} -7 & 1 & +3 & 2 & 210 \\ & \downarrow & -7 & 28 & -210 \\ \hline & 1 & -4 & 30 & \end{array}$$

$(x+7)(x^2-4x+30)$

$x^2-4x+30$

this doesn't factor. so there are no integer answers

$x=-7$ is the only answer

the #s are $-7, -6, -5$

HW: pg 149 #10, 14, 15,16,
chapter review