

Quiz Review 4.1 - 4.4

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

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

Total # of roots: 3

Real Roots: 1

Imaginary Roots: 2

Absolute min: none

Absolute max: none

Relative max: $(-.229, 5.253)$

Relative min: $(.729, 3.497)$

As $x \rightarrow \infty, f(x) \rightarrow \infty$

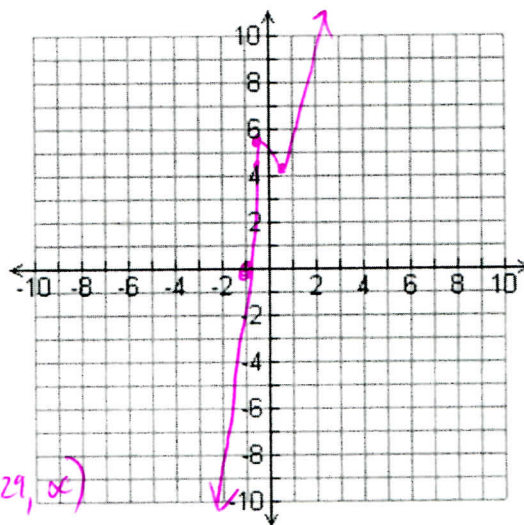
As $x \rightarrow -\infty, f(x) \rightarrow -\infty$

Increasing interval(s): $(-\infty, -.229) \cup (.729, \infty)$

Decreasing interval(s): $(-.229, .729)$

Find a window that shows the whole graph.

x min -10 x max 10
y min -10 y max 10



2. $f(x) = -x^4 + 2x^3 + 4x^2 - 11x + 6$

Domain: $(-\infty, \infty)$

Range: $(-\infty, 19.915]$

Total # of roots: 4

Real Roots: 4

Imaginary Roots: 0

Absolute min: none

Absolute max: $(-1.383, 19.915)$

Relative min: $(1.141, -.067)$

Relative max: $(1.742, .34)$

As $x \rightarrow \infty, f(x) \rightarrow -\infty$

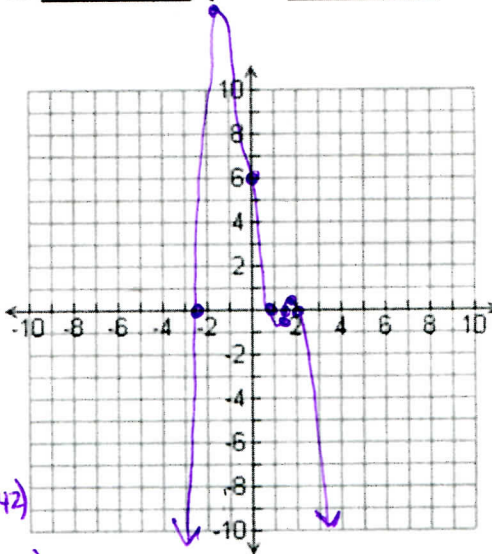
As $x \rightarrow -\infty, f(x) \rightarrow -\infty$

Increasing interval(s): $(-\infty, -1.383) \cup (1.141, 1.742)$

Decreasing interval(s): $(-1.383, 1.141) \cup (1.742, \infty)$

Find a window that shows the whole graph.

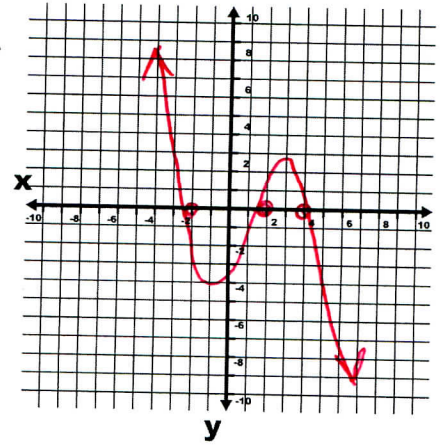
x min -10 x max 10
y min -10 y max 20



Sketch a graph matching each description without your calculator. Then use your calculator to check your sketch.

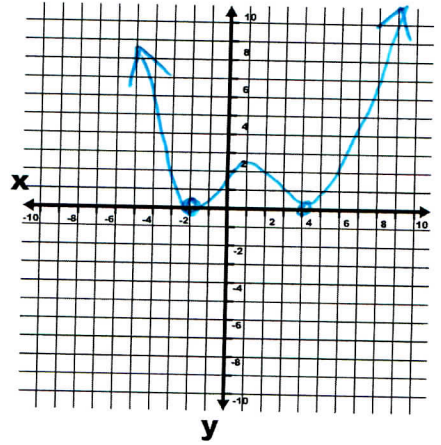
3) A cubic function with 3 real zeros and a negative leading coefficient.

3



4) A quartic function with 2 real zeros where each has a multiplicity of two. The leading coefficient is positive.

4



State the degree, end behavior, y-intercept, x-intercepts, and increasing/ decreasing intervals for the following functions.

5) $(x + 2)(x - 4)(5 - x)$

D: 3 odd
LC: -1 neg
y-int: $(0, -40)$
Zeros: $x = -2, 4, 5$



$(4.519, 1.627)$

As $x \rightarrow \infty, y \rightarrow -\infty$
As $x \rightarrow -\infty, y \rightarrow \infty$

INC: $(0, 4.519)$

DEC: $(-\infty, 0) \cup (4.519, \infty)$

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

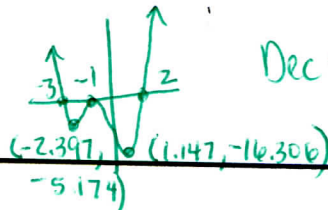
D: 4 even
LC: 1 pos
y-int: $(0, -6)$
Zeros: $-3, -1, 2$



As $x \rightarrow \pm \infty, y \rightarrow \infty$

INC: $(-2.397, -1) \cup (1.147, \infty)$

DEC: $(-\infty, -2.397) \cup (-1, 1.147)$



Simplify the following polynomials completely. Write your final answer in standard form.

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

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

$-x^3 + 4x^2 - 8x - 9$

cubic polynomial

D: 3 odd

LC: -1 neg



8) $(n - 2)(n^3 - 2n + 7)$

	n^3	$-2n$	$+7$
n	n^4	$-2n^2$	$+7n$
-2	$-2n^3$	$+4n$	-14

$n^4 - 2n^3 - 2n^2 + 11n - 14$

quartic polynomial

D: 4 even LC: 1 pos

First determine if the binomial is a factor of the polynomial given using the Remainder Theorem. Then divide to prove your answer. Be able to use both long division and synthetic division.

9) LONG division. $(2x^3 - x^2 - 13x - 6) \div (2x + 1)$

	$x^2 - x - 6$	
$2x + 1$	$\overline{) 2x^3 - x^2 - 13x - 6}$	
	$- 2x^3 + x^2$	\downarrow
	$\hline -2x^2 - 13x$	\downarrow
	$- -7x^2 - x$	\downarrow
	$\hline -12x - 6$	
	$- -12x - 6$	
	$\hline 0$	

$x = -\frac{1}{2} P(-\frac{1}{2}) = 2(-\frac{1}{2})^3 - (-\frac{1}{2})^2 - 13(-\frac{1}{2}) - 6$

yes $P(-\frac{1}{2}) = 0$ ✓
a factor

$x^2 - x - 6$

10) SYNTHETIC division. $(x^4 + 2x^3 - x^2 + 6) \div (x - 1)$

\downarrow	1	2	-1	0	6
$+$	\downarrow	1	3	2	2
		1	3	2	2
					8

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

not $P(1) = 8$ X
a factor

$x^3 + 3x^2 + 2x + 2$ R. 8

OR

$x^3 + 3x^2 + 2x + 2 + \frac{8}{x-1}$

Factor the polynomials completely.

11) $12x^3 + 96x^2 + 192x$

$$12x(x^2 + 8x + 16)$$

12) $108x^6 + 32x^3$

$$4x^3(27x^3 + 8)$$

Sum of cubes
 $a=3x$ $b=2$

$$4x^3(3x+2)(9x^2-6x+4)$$

13) $x^3 + x^2 - 16x - 16$

diff of squares

$$x^2(x+1) - 16(x+1)$$

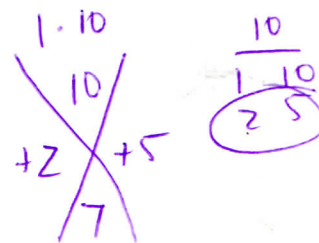
$$(x^2-16)(x+1)$$

$$(x+4)(x-4)(x+1)$$

14) $7p^{12} + 49p^9 + 70p^6$

$$7p^6(p^6 + 7p^3 + 10)$$

$$7p^6(p^3+2)(p^3+5)$$



15) Show that $x-2$ is a factor of $f(x) = 3x^4 - 8x^3 + 4x^2 + 4x - 8$. Then factor completely.

$$\begin{array}{r|rrrrrr} 2 & 3 & -8 & 4 & 4 & -8 \\ & + & \downarrow & 6 & -4 & 0 & 8 \\ \hline & 3 & -2 & 0 & 4 & 0 \end{array}$$

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

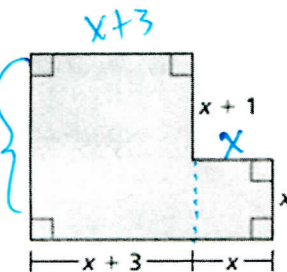
Cannot keep going but try

Random:

16) Write an expression for the area and perimeter for the figure shown.

Perimeter: $(x+3) + (x+1) + (x) + (x) + (x) + (x+3) + (2x+1)$

CLT = $8x + 8$ u



Area: $x(x) + (2x+1)(x+3)$

$$= x^2 + 2x^2 + 6x + x + 3$$

$$= 3x^2 + 7x + 3 \text{ u}^2$$