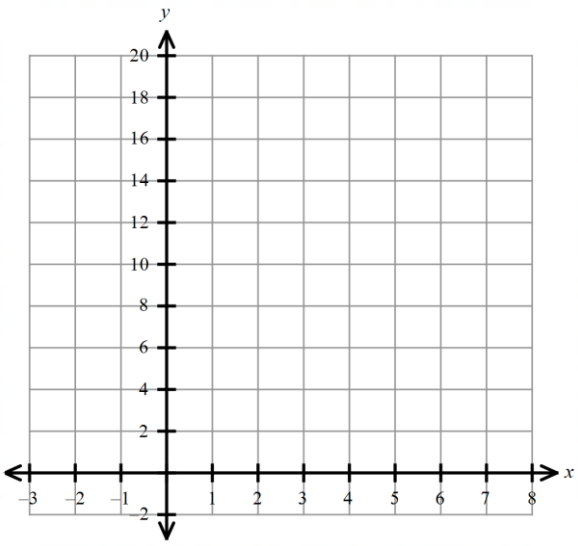
Math 126 **Ch 2 Review Wk** **Name**_____

Scientific Calculators allowed.

For #1 – 4, use $f(x) = -2x^2 + 8x + 10$.

1) Write $f(x)$ in vertex form by completing the square.



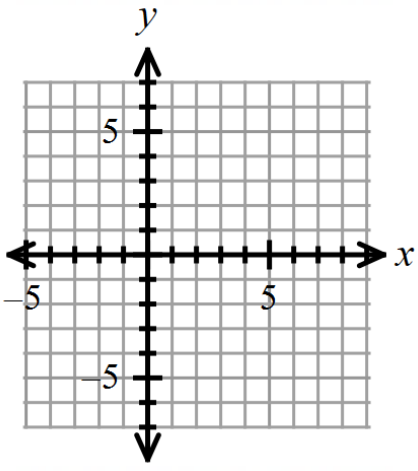
2) Find the coordinates of all intercepts.

3) Graph $f(x)$ on the provided coordinate system above. Include the vertex and all intercepts.

For #4 – 5, use $g(x) = \frac{1}{2}(x-4)^2 - 6$.

4) Find the requested information for $g(x)$ in the table below. If needed, round to one decimal place.

5) Graph $g(x)$ on the provided coordinate system. Include the vertex and any intercepts.



Vertex:	Opens up or down?
Axis of symmetry:	x −intercepts (if any):
y −int:	max or min? Value:
Domain (interval notation):	Range (interval notation):

6) Joseph has started a company that makes mountain bikes. The profit from selling x bikes can be found by using $P(x) = -200x^2 + 92000x - 8{,}400{,}000$. What is the max profit that his company can earn?

7) Consider $h(x) = -3x(x+2)^2(x-4)$. Which the statements below are true? **Select all that apply.**

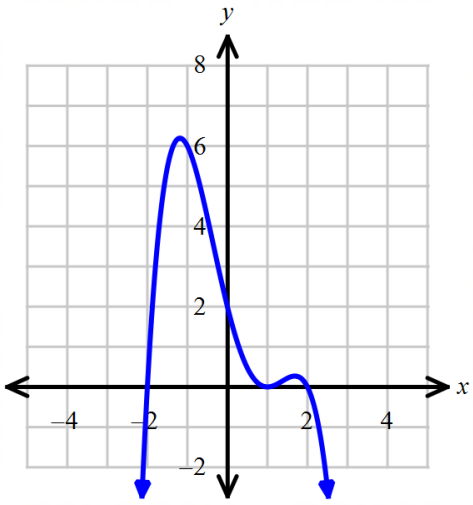
A) $h(x)$ has zeros at $x = -2, 0, \text{and } 4$
B) The zero at $x = 4$ has a multiplicity of 2.
C) As $x \to \infty, h(x) \to -\infty$
D) As $x \to -\infty, h(x) \to -\infty$
E) The end behavior for $h(x)$ is different on the left and right sides.
F) $h(x)$ *crosses* the x-axis exactly twice.

For #8 – 9: Find the zeros and give the multiplicity for each zero, as needed.

8) $y = x^3 - x^2 - 9x + 9$

9) $g(x) = x^3 + 8x^2 + 16x$

10) Alexis, Pattra, and Adrian were working on a problem together in math where they had to match a graph with its equation. Alexis believes the graph shown is a match for $f(x) = -\frac{1}{2}(x-1)^2(x+2)$, Pattra believes the graph is a match for $h(x) = -\frac{1}{2}(x-1)^2(x-2)(x+2)$. Adrian said the graph was a match for $g(x) = -\frac{1}{2}(x-1)^2(x+2)^2$.
Who is correct, and how do you know?



11) Which of the following statements are true for $f(x) = 3x^4 + 2x^5 + 17x^6 - 3$? **Select all that apply.**

A) $f(x)$ has 6 total zeros (real and imaginary combined)
B) $f(x)$ has 4 total zeros (real and imaginary combined)
C) as $f(x) \to \infty, f(x) \to \infty$
D) as $f(x) \to \infty, f(x) \to -\infty$
E) as $f(x) \to -\infty, f(x) \to \infty$
F) as $f(x) \to -\infty, f(x) \to -\infty$

12) Find the quotient: $(2x^4 - 11x^3 + 8x^2 + 15x - 8) \div (x^2 + 1)$

13) List all *possible* rational roots for $y = 3x^4 - 7x^2 + 8x + 10$.

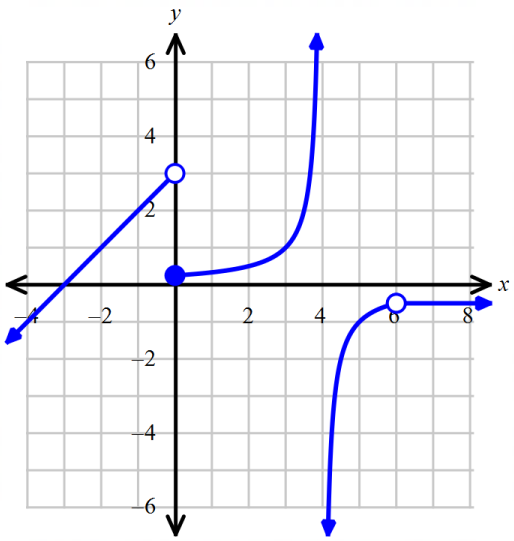
14) Given that $g(x) = 3x^3 - 5x^2 - 6x + 8$ and 2 is a zero for $g(x)$, then solve $g(x) = 0$ for all solutions.

15) **Multiple Choice.** Use Descartes' Rule of Signs to determine the possible number of positive and negative real zeros for $f(x) = x^5 - 1.5x^4 - 13.76x^3 + 3x^2 + 34.42x - 15.397$.

A) 2 or 0 positive zeros; 3 or 1 negative zeros
B) 3 or 1 positive zeros; 3 or 1 negative zeros
C) 3 or 1 positive zeros; 2 or 0 negative zeros
D) 2 or 0 positive zeros; 2 or 0 negative zeros

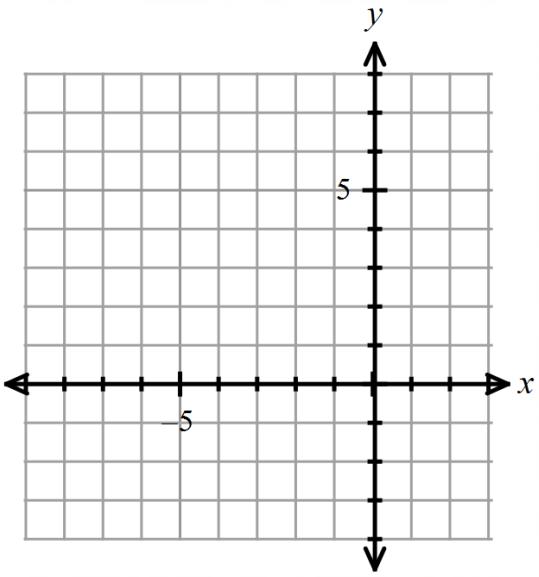
16) Find all rational zeros for $f(x) = 3x^3 - 19x^2 + 30x - 8$.

17) Given the graph of $f(x)$ as shown below, identify the x-values for each discontinuity. Classify each discontinuity as removable or non-removable, and describe it as either a hole, vertical asymptote (infinite discontinuity), or a jump discontinuity.



18) Find the equations of all asymptotes for $y = \frac{3x^2-8x+12}{x+4}$

19) Graph $g(x)$ and fill out all the information in the table. Write "none" as applicable. $g(x) = \frac{2x^2+2x-4}{x^2+3x-4}$



VA (if any):	HA (if any):
x −int (if any)	y −int (if any):
Hole (if any)	Slant asymptote (if any):
Domain:	Range:

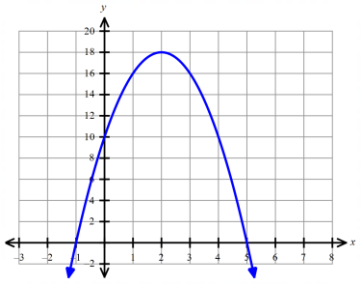
20) Solve and graph the solution on the provided number line:

$$\frac{x-4}{x+5} \leq 0$$

21) Solve the inequality, and graph the solution set on the provided number line: $2x^2 - x > 15$

Answers:

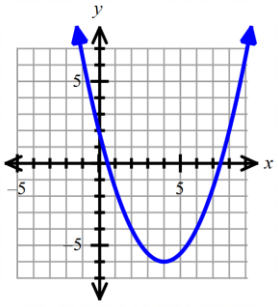
1) $f(x) = -2(x-2)^2 + 18$ 2) $y-$ int: $(0, 10)$; $x-$ int: $(5, 0)$ and $(-1, 0)$ 3)



4)

Vertex: $(4, -6)$	Opens up or down? UP
Axis of symmetry: $x = 4$	$x-$intercepts (0.5, 0) and (7.5, 0)
$y-$int: (0, 2)	max or min? MIN Value: -6
Domain: $(-\infty, \infty)$	Range: $[-6, \infty)$

5)



6) \$2,180,000 7) A, C, D, F

8) $x = -3, 1, 3$ (all multiplicity of 1) 9) $x = 0$ (multiplicity of 1), -4 (multiplicity of 2)

10) Pattra is correct. The x-int at $x = 1$ has a multiplicity of 2, and so it "bounces" off the x-axis. The x-intercepts at $x = 2$ and $x = -2$ both have a multiplicity of 1, and thus they both cross the x-axis. The leading coefficient is negative, and so $h(x)$ goes down on the right side. The degree is 4 (an even number), and thus the end behavior on the left matches the end behavior on the right.

11) A, C, E 12) $2x^2 - 11x + 6 + \frac{26x-14}{x^2+1}$ 13) $\pm 10, \pm 5, \pm 2, \pm 1, \pm\frac{10}{3}, \pm\frac{5}{3}, \pm\frac{2}{3}, \pm\frac{1}{3}$

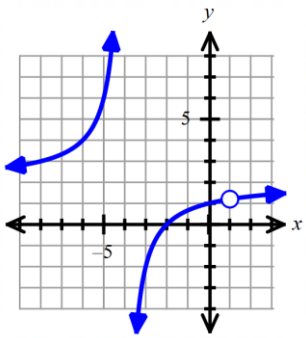
14) $x = -\frac{4}{3}, 1,$ and 2 15) C 16) $x = \frac{1}{3}, 2,$ and 4

17) at $x = 0$; non-removable (jump discontinuity); at $x = 4$; non-removable (VA/infinite discontinuity); at $x = 6$; removable (hole)

18) VA: $x = -4$; HA: none; Slant: $y = 3x - 20$

19)

VA (if any): $x = -4$	HA (if any): $y = 2$
$x-$int: $(-2, 0)$	$y-$int: $(0, 1)$
Hole: $\left(1, \frac{6}{5}\right)$	Slant asymptote: none
Domain: $\{x \mid x \neq -4, 1\}$	Range: $\{y \mid y \neq \frac{6}{5}, 2\}$



20) $(-5, 4]$

21) $\left(-\infty, -\frac{5}{2}\right) \cup (3, \infty)$