EXAM 1 - MATH 111

YOUR NAME:_____

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Given the function $f(x) = 2x - x^2$, compute and simplify the following:
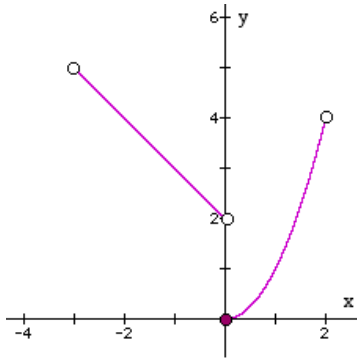
$f(a) =$

$f(a + 3) =$

$$\frac{f(a + 3) - f(a)}{3} =$$

    (b) Given the function $g(x) = x^2 + 9x$, find the values of the input for which $g(x) = 22$.

2. (a) Find the domain of $f(x) = \dfrac{x+1}{x^2 - 4x}$.

(b) Find the domain of $g(x) = \sqrt{5 - 9x}$.

(c) Given the function shown below, write clearly its domain and range in interval notation.



3. An hourly employee receives hourly pay $16.00 for working at most 40 hours a week. If she works overtime, (i.e., more than 40 hours) her overtime hours are compensated at the hourly rate of $21.00.

(a) Write a piece-wise defined function for the amount $C(h)$ of compensation that is owed the employee for having worked h hours. Please, use proper notation.

(b) Compute the amount owed at the end of a 45-hour week.

4. Consider the function $y = f(x)$ whose graph is shown below. Both parts refer to the same graph.
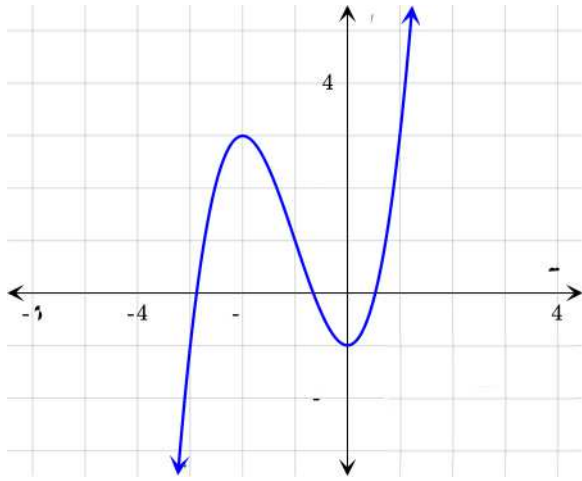
(a) Find the average rate of change over the interval $[-2, 1]$.

(b) Give the intervals over which $f(x)$ is increasing and over which $f(x)$ is decreasing

(c) Give all all local max and min points.

5. (a) Let $f(x) = \dfrac{2x - 7}{3x - 1}$ and $g(x) = x^2 + 3$. Find $(f \circ g)(x)$ and simplify.

(b) In this part $f(x)$ is the function whose graph is shown on the left and $g(x)$ is given by the following table:
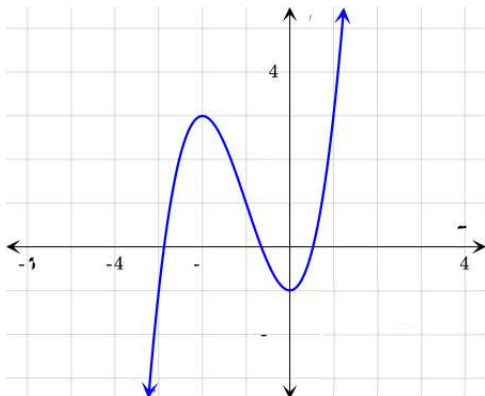
x	−1	0	1	2	3
$g(x)$	−3	2	7	−5	0

Compute the following, showing all steps:

$(g \circ f)(-1) =$

$(f \circ g)(3) =$

$(g \circ g)(0) =$