EXAM 3 - MATH 140

DATE: Friday, October 13

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- 1. (a) Solve the equation $\sqrt{3x-5} \sqrt{x+7} = 2$. (2 points)
 - (b) Solve the absolute value equation $|x^2 2x| = 3$. (2 points)
 - (c) Solve the absolute value inequality |1 4x| 7 < -2. (1 point)
- 2. (a) Pick 3 points and roughly sketch the graph of $f(x) = -(x-1)^2$. (1 point)
 - (b) Roughly sketch the graph of $g(x) = (x-3)^3 + 1$. (1 point)
 - (c) Find the domain (1 point) and sketch the graph (2 points) of the piece-wise defined function

$$h(x) = \begin{cases} -(x-1)^2, & \text{if } x \le 1\\ -2x+4, & \text{if } 1 < x \le 2\\ (x-3)^3+1, & \text{if } x > 2 \end{cases}$$

3. Fill in the rows of the following table indicating the transformation that took place going from left to right and down. (Each 1 point)

- 4. Consider the polynomial function $f(x) = (x+4)^2(x+1)(x-3)^2$.
 - (a) Find the roots of y = f(x) (1 point)
 - (b) Construct the sign table for f. (2 points)
 - (c) Roughly sketch the graph of y = f(x). (2 points)

5. Consider the rational function
$$f(x) = \frac{x^3 - x^2 - 6x}{(x+1)(x-2)^2}$$

- (a) Factor the numerator. (0.5 points)
- (b) Find the domain of f. (0.5 points)
- (c) Find the x- and the y-intercepts of f. (0.5 points)
- (d) Find the vertical and the horizontal asymptotes of f. (0.5 points)
- (e) Create the sign table for f. (1 point)
- (f) Roughly sketch the graph of y = f(x). (2 points)