

PRACTICE EXAM 4 - MATH 140

DATE: Friday, October 27

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. Solve the following inequalities:

(a) $\frac{x^2(x+5)(x-2)}{(x-3)^2(x+1)} \leq 0$ (2 points)

(b) $\frac{1}{x+7} > \frac{2}{x-3}$ (3 points)

2. Consider the two functions $f(x) = \frac{x-3}{x+5}$ and $g(x) = \sqrt{1-x}$.

(a) Find the domain of f and the domain of g . (1 point)

(b) Find a formula for the composite $(g \circ f)(x)$. (1 point)

(c) Give the conditions that must be satisfied by x for x to be in the domain of $g \circ f$. (1 point)

(d) Use these conditions to actually find the domain of $g \circ f$. (2 points)

3. Consider the function $f(x) = 3^x$.

(a) Make a rough sketch of the graph of f . (1 point)

(b) Describe the transformations that may be used to pass from f to the function $g(x) = 5 - 3^{(1/2)x}$. (2 points)

(c) Use the transformations of the previous part and the graph you sketched in the first part to obtain a rough sketch of the graph of g . (2 points)

4. Solve the following exponential equations:

(a) $27^{x^2-2x} = \frac{1}{3}$ (2 points)

(b) $81^x \cdot 3^{x^2} = 9^6$ (3 points)

5. (a) Use a small 3-value table to roughly sketch the graph of the function $f(x) = \log_4 x$. (1 point)

(b) Describe the transformations that may be performed to obtain from the graph of f the graph of the function $g(x) = 2 \log_4 (3 - x)$. (2 points)

(c) Use the information in the previous two parts to sketch the graph of g . (2 points)