TEST 5 - MATH 140

DATE: Friday, February 10

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. Find the domain of the following functions:

(a)
$$f(x) = \frac{2x+7}{-x^3+7x^2-10x}$$
 (2 point)
(b) $h(x) = \sqrt{\frac{2-5x}{x^2-4}}$ (3 points)

- 2. Consider the polynomial function $f(x) = (x+3)(x-1)^2(x-5)$.
 - (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)
- 3. Consider the rational function $f(x) = \frac{-x^3 + 8x^2 7x}{(x+3)(x-5)^2}$.
 - (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)
- 4. (a) A polynomial function y = f(x) has degree 6 and roots -3 of multiplicity 1, -2 of multiplicity 2 and 1 of multiplicity 3. Find the formula for y = f(x) if you know that its graph passes through the point (2, 240). (2 points)
 - (b) A rational function y = g(x) has x-intercepts at -1, 1 and 4, vertical asymptotes x = -3 and x = 2 and a horizontal asymptote at y = -5. Find a possible formula for y = g(x). (3 points)
- 5. Solve the following inequalities:

(a)
$$\frac{x^2(x+5)(x-2)}{(x-3)^2(x+1)} \le 0$$
 (2 points)
(b) $\frac{1}{x+7} > \frac{2}{x-3}$ (3 points)