EXAM 3 - MATH 111

DATE: Wednesday, November 2 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

- 1. Study (find the vertex, the opening direction, the intercepts and roughly sketch the graph) the function $f(x) = -\frac{1}{2}x^2 x + \frac{3}{2}$.
- 2. Take two positive numbers. The sum of the first plus three times the second is 20. If the product of the two numbers is $\frac{117}{4}$ find the two numbers.
- 3. (a) Study (find the x- and y-intercepts, create the sign table, and roughly sketch the graph) the polynomial function $f(x) = (x-3)^2(1-x)(x+1)^2(x-2)$.
 - (b) Solve the polynomial inequality $(x-3)^2(1-x)(x+1)^2(x-2) \ge 0$.
- 4. Study (find the domain, the x- and y-intercepts, the horizontal and vertical asymptotes, create the sign table, and roughly sketch the graph) the rational function $f(x) = \frac{(x+1)(x^2-1)}{x(2-x)(x+3)}$.
- 5. Find a possible equation for the rational function whose graph is depicted below:

6. A rectangular field bounded on one side by a river is to be fenced on the other three sides. Fencing material for the side parallel to the river costs \$30 per foot and material for the other two sides costs \$10 per foot. What are the dimensions of the field that provide the largest possible area, if \$1,200 are to be spent for fencing material?