

Final

Math 211

Please write your name on top of every sheet.
You have 2 hours
Good luck!

1) Where is the following function continuous? Give reasons for your answer.

$$f(x) = \begin{cases} 5e^{x-1} - x + 1 & \text{if } x < 1, \\ 6 - x & \text{if } 1 \leq x \leq 4, \\ (x - 4)^2 & \text{if } x > 4. \end{cases}$$

(10 points)

2) Determine where the graph of the following function is concave up and where concave down.

$$f(x) = \frac{6}{x^2 + 3}$$

(10 points)

3) Compute the following integral

$$\int \frac{\ln(x+1)}{\sqrt{x+1}} dx.$$

(15 points)

4) Solve the following initial value problem

$$\frac{dy}{dx} = -6xy \quad y(0) = 7.$$

(10 points)

5) Compute

$$\int_0^1 \frac{1}{x^3 - 4x^2 + x + 6} dx.$$

(20 points)

6) Find the relative extrema and saddle points of

$$f(x, y) = xy - \frac{1}{4}x^4 - \frac{1}{4}y^4.$$

(20 points)