## EXAM 4 - MATH 251 YOUR NAME:

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Use Lagrange Multipliers to find the max and min value of  $f(x, y) = e^{xy}$  subject to the constraint  $x^2 + 4y^2 = 4$ .

2. Evaluate the iterated integral  $\int_{1}^{4} \int_{1}^{2} \left(\frac{x}{y} + \frac{y}{x}\right) dy dx$ .

3. Evaluate the iterated integral  $\int_0^1 \int_{\sqrt{y}}^1 \sqrt{x^3 + 1} \, dx dy$ .

4. Evaluate the iterated integral  $\int_0^1 \int_x^1 \sin(y^2) \, dy dx$ .

5. Express the domain D which is shaded in the following figure in polar coordinates. Then compute  $\iint_{D} (x^2 + y^2)^{-2} dA$  using polar coordinates.

