

**SAMPLE MIDTERM**  
**MATH 16B**

1. Find  $\frac{\partial f}{\partial x}$ ,  $\frac{\partial f}{\partial y}$ ,  $\frac{\partial^2 f}{\partial x^2}$ ,  $\frac{\partial^2 f}{\partial x \partial y}$ ,  $\frac{\partial^2 f}{\partial y^2}$  if

$$f(x, y) = e^{xy} \tan(x).$$

2. Find all relative maxima and minima for the function

$$f(x, y) = \frac{1}{x} + \frac{1}{y} + xy.$$

3. Find the point on the hyperbola  $xy = 1$  that has the minimal distance to the point  $(-1, 1)$ .

4. Evaluate the integral

$$\iint_R xy \, dy \, dx$$

over the triangle  $R$  with vertices  $(0,0), (2,0), (2,1)$ .

5. Evaluate the following integrals

$$\int_0^{\pi/2} \frac{\sin x}{1 + \cos x} dx;$$

$$\int_1^2 x \ln x \, dx;$$

$$\int_0^{\infty} \frac{2x}{(x^2 + 1)^3} dx.$$

6. The population of a small town was 1000 in 1998, 2100 in 2000 and 4050 in 2004. Assuming that the population grows linearly predict the population in 2010.