Show all work. Circle your answer.

No books, no notes, no calculator, no cell phones, no pagers, no electronic devices at all.

Solutions will be posted shortly after the exam: www.math.wisc.edu/∼miller/m213

Name_____

Circle your DIScussion section (column one):

TA: Youngsuk Lee

DIS 301	8:50 T	6322 SOC SCI
DIS 302	8:50 R	215 INGRAHAM
DIS 303	9:55 T	225 INGRAHAM
DIS 304	9:55 R	495 VAN HISE

Problem	Points	Score
1	5	
2	5	
3	6	
4	8	
5	8	
6	10	
7	8	
Total	50	

1. (5 pts) Find all first and second order partial derivatives of the function:

$$f(x, y) = e^{x+y^2}$$

Circle your answer.

2. (5 pts) Find the average of the function

$$f(x) = \frac{1}{x \ln(x)}$$

on the interval $[2, 5]$.

Circle your answer.

3. (6 pts) Graph the first octant of the plane determined by the equation:

$$x + 3y + 2z = 6$$

Circle your answer.

4. (8 pts) Determine whether the integral below converges or diverges and find its value if it converges.

$$\int_1^\infty \frac{2x}{(x^2+1)^3}\,dx$$

Circle your answer.

5. (8 pts) The function

$$f(x) = 2000e^{-.01x}$$

represents a flow of money in dollars per year over 3 years. Assume 5% per year compounded continuously. Find

(a) the present value

(b) the accumulated amount after 3 years.

Circle your answer.

6. (10 pts) Find the critical points of the function and classify each as either saddle points or relative (or local) maximums or minimums.

$$f(x, y) = 2x^2 - 4xy + y^4 + 2$$

Circle your answer.

7. (8 pts) The graph of the function $y = \sqrt{x}$ for x such that $0 \leq x \leq k$ is rotated around the x-axis, i.e. $y = 0$. The volume of the solid of rotation is 8π. What is k?

Circle your answer.

Answers

1. $f_x = e^{x+y^2} = f_{xx}$, $f_y = 2ye^{x+y^2} = f_{xy} = f_{yx}$, $f_{yy} = 2e^{x+y^2} + 4y^2e^{x+y^2}$.

2. Substitue $u = \ln(x)$ and $du = \frac{1}{x}dx$.

$$\frac{1}{5-2}\int_2^5 \frac{1}{x\ln(x)}dx = \frac{1}{3}(\ln(\ln(5)) - \ln(\ln(2)))$$

3. The plane intersects the three axis at $(6,0,0)$ and $(0,2,0)$ and $(0,0,3)$

4. Converges to $\frac{1}{8}$. Substitute $u = x^2 + 1$ and $du = 2xdx$.

5.
(a) $\int_0^3 e^{-.05x}2000e^{-.01x}dx = 2000\int_0^3 e^{-.06x}dx = \frac{2000}{.06}(1 - e^{-.18})$
(b) ($e^{.15}$) times part (a)

6. Saddle at $(0,0)$, loc mins at $(1,1)$ and $(-1,-1)$.

7.

$$\int_0^k \pi y^2\, dx = \int_0^k \pi x\, dx = \pi\frac{k^2}{2} = 8\pi$$

so $k = 4$.