2018 Fall BIOS 2081 Sample Midterm Exam

You may bring notes on one sheet of 8.5x11 paper and may use the front and back of the paper

No calculators may be used for the exam

For problems 1-2, evaluate the following integrals:

1. $\int x\, e^{2x}\, dx$

2. $\int x\sqrt{(1-x^2)}\, dx$

3. Determine whether the series is convergent or divergent. If convergent, find the sum.

$$\sum_{n=1}^{\infty} \frac{(-3)^{n-1}}{4^n}$$

4. Determine whether the integral is convergent or divergent. Evaluate if convergent.

$$\int_4^{20} \frac{1}{\sqrt{x-4}}\,dx$$

5. Find all second partial derivatives

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

6. Find the critical points and determine whether they are local minima or maxima.

$$f(x,y) = x^3 + 6x^2 + 3y^2 - 12xy + 9x$$

7. Find the extreme values on the set D, such that

$$D = \{(x,y) \mid 0 \le x \le 2,\ 0 \le y \le 3\}$$ and $f(x,y)=x^2-5xy+2y^2$

8. Use the given transformation to evaluate the given integral

$$\iint_R (3x + 6y)^2$$

Where R is the region bounded by:

x-2y = 2, x+2y = 2, x+2y = -2, and x-2y = -2

and T^{-1}: $\begin{bmatrix} U=x+2y \\ V=x-2y \end{bmatrix}$