

Name: _____

ID Number: _____

Instructions: Clearly answer each of the questions below. Remember to check the back side. Show your work and any formulas you employ. Simplify all answers as far as possible. Box your answers.

1. If $f : \mathbb{R} \rightarrow \mathbb{R}$ is a function, what is one possible definition of the derivative of $f(x)$ at x ?

2. What is the Maclaurin series of e^x ?

3. Find the Jacobian of the vector field $G(x, y) = (y^3/x + 3, \sin(x) + y)$.

4. Given vectors $\vec{a} = [2, 7, -2]$ and $\vec{b} = [1, 2, 5]$, what is $\vec{a} \cdot \vec{b}$?

5. Calculate the following matrix product:

$$\begin{bmatrix} 4 & 0 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$$

6. What is

$$\begin{bmatrix} 3 & -2 \\ 2 & 3 \end{bmatrix}^{-1} ?$$

7. Draw a unit circle, and label at least 16 different points on that circle with their standard angles (in radians) and their Cartesian coordinates.

8. What does Green's theorem from vector calculus say?

9. Explain the meaning of 0^0 ?