Name:_____ Soc.Sec.No.:_____
Present Calculus Course:_____ Instructor:_____
Permanent Mailing Address:_____
_____

School (Natural Sciences, Engineering, etc.)_____

Show your work!

1. Let $f(x) = x^{50}e^{2x}$. Find $f^{(100)}(0)$. (Hint: Consider the Taylor Series. Recall that $f^{(n)}(x)$ means the nth derivative of $f(x)$.)

2. A bicyclist is at the perpendicular intersection of 2 straight roads on a perfectly flat plain. The cyclist can travel along the roads at 20 miles per hour, and he can travel cross-country at 10 miles per hour. He wants to go to a farmhouse which lies 10 miles from each of the roads. What is the least time required for the cyclist to reach the farmhouse?

3. Compute the indefinite integral

$$\int e^x \cos(2x)\sin(3x)\, dx \ .$$

4. The two parallel planes $x + 2y + 3z = 1$ and $x + 2y + 3z = 4$ intersect the plane $x + y + z = 5$ in lines L_1 and L_2, respectively. Find the distance between the two lines.

5. A 3-dimensional region Ω is obtained by rotating the inside of the ellipse $x^2 + 4y^2 = 25$ about the x-axis. The cylinder C is all points in 3-dimensional space whose distance from the x-axis is no greater than 2. Find the volume of the 3-dimensional region that is inside Ω but outside C.