

Name: _____

Each problem is worth 25 points. Since a problem was thrown out of the initial revision of the exam, you will receive an extra 25 points.

1. Find

$$\frac{d}{dx} [\sin (\ln (\cos x))]$$

2. Find a tangent to the graph of $\log_3(xy + 26) = 3^{xy}$ when $(x, y) = (-1, -1)$. (Hint: once you have an equation involving y' , substitute $(x, y) = (-1, -1)$ before solving for y' .)

3. Approximate the value of $\sqrt{99}$ using local linear approximation. Perform all arithmetic by hand, and use a graph to illustrate whether your approximation is an underestimate or an overestimate.

4. Find the tangent to the curve given in polar coordinates by $r = \sin \theta$ when $(r, \theta) = (1, \frac{\pi}{2})$.

5. Find

$$\frac{d}{dx} (\sqrt{x})^{\sin x}$$

6. Find the global maximum and minimum of $f(x) = x^3 - x$ on $[-1, \infty)$.