Exam 3

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

$$\frac{\mathrm{d}}{\mathrm{d}x}\left[\frac{\ln\left(\sin\left(x\right)\right)}{\sqrt{\cos x}}\right]$$

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 $\frac{1}{1010}$ 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 $r = \sqrt{\theta}$ when $(r, \theta) = \left(\sqrt{\frac{\pi}{2}}, \frac{\pi}{2}\right)$.

5. Find

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(\ln x\right)^{\sqrt{x}}$$

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