

Name \_\_\_\_\_

- You have 15 minutes
- No calculators
- Show sufficient work

1. (2 points) What is the slope of the curve  $y = 5e^x - 25 \tan(x) + 50 \sin(x) + 10x^2 - 100$  at its y-intercept?

2. (2 points) There are an infinite number of points on the curve  $f(x) = -6 \cos x + 5x - 42$  for which the line tangent to the curve is perpendicular to the line  $2x + 16y = 5$ . Determine the  $x$ -value for at least one of these points.

3. (2 points each) Using Leibniz notation (i.e.,  $\frac{dy}{dx}$ ,  $\frac{dP}{dt}$ , etc.), find derivatives for each of the following functions.

(a)  $q = \left(\frac{x\sqrt{x}}{\sqrt[3]{x}}\right)^{12} + \ln\left(\frac{\pi^3}{e^2 + 4}\right)$  (simplify your answer)

(b)  $R = v^4 \csc(v)$

(c)  $w = \frac{5}{\sqrt{t} + 5e^t}$