

Name \_\_\_\_\_

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

1. (2 points) Find the  $x$ -value for each point on the graph of  $f(x) = x^3 + 150$  where the line tangent to the curve is perpendicular to the line  $y = -12x + 7$ .

2. (2 points) What is the slope of the curve  $y = 5 \tan x + 3 \cos x$  at its y-intercept?

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

(a)  $q = \left( \frac{x\sqrt{x}}{\sqrt[3]{x}} \right)^{12}$

(b)  $p = 10y^3 \sin y + \ln \left( \frac{5}{e^2} \right)$

(c)  $w = \frac{4}{t^8 + 5e^t}$