

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. A car rental company finds that it can rent 60 cars if it charges \$80 for a weekend. It estimates that for each \$5 price increase, it will rent 3 fewer cars. Find the price that should be charged to maximize the company's revenue.

2. Find an equation for the tangent line to the curve $x^2y^2 - xy = 2$ at the point $(x, y) = (-1, 1)$.

3. A company finds that its revenue from selling x units of a product is $R(x) = x^2 + 500x$ dollars. If the company's sales are increasing at the rate of 50 units/month, how fast is the revenue changing when 200 units have been sold?

4. (a) In how many years would an investment earning 12% compounded monthly triple?

- (b) How much should your parents put aside now to finance the estimated cost of \$50,000 of your little brother's education in 10 years time, under the hypothesis of a constant annual interest rate of 6% compounded semiannually?

5. Calculate the following derivatives:

(a) $f(x) = 2x^3 - 3xe^{5x}$

(b) $g(x) = \ln(\sqrt{x^7 + 1})$.