

This is a Take-Home Quiz. You may use your book and course notes, and you may consult with other members of the class, but you may not consult with outside tutors (at least not on these specific problems).

1. (2 points each) Find the first derivative of the following functions:

(a) $f(x) = x^3 e^{5x}$

(b) $f(x) = \frac{x^2+1}{e^{2x}-1}$

(c) $f(x) = e^{e^{x^2}+1}$

(d) $f(x) = \ln[(3x^2 + 1)^4]$

(e) $f(x) = e^{x^2} \ln(x^2 - 1)$

2. (a) (2 points) Suppose you invest \$ 5000 in an account that pays 5% annual interest, compounded quarterly. How long will it take for your investment to triple?
- (b) What interest rate would be needed in order for a \$5000 investment to double in 5 years, provided that the interest is compounded monthly?
3. (3 points) Use logarithmic differentiation to find the first derivative of $y = (3x - 1)^2(x^2 + 1)^3(5x - 2)^{\frac{3}{2}}$
4. (2 points) Find the tangent line to the function $f(x) = \ln(x^2 - 3)$ when $x = 2$