
Please provide complete and well-written solutions to the following exercises.

Due April 3, at the beginning of class.

Assignment 1

Exercise 1. Let $f(x) = e^{x^2}$. Find the equation of the tangent line to f at $x_0 = 1$.

Exercise 2. Differentiate $f(x) = e^{(x^2+3x+2)^2}$.

Exercise 3. Let $f(x) = x^2e^x$. Find the critical points of f . Classify these critical points as local maxima, local minima, or neither.

Exercise 4. Let j be a positive integer. Let $f(x) = x^j e^x$. Find the critical points of f . Classify these critical points as local maxima, local minima, or neither.

Exercise 5. Evaluate the integral

$$\int_0^5 e^{-10y} dy.$$

Exercise 6. Evaluate the integral

$$\int_1^3 ye^{3y^2} dy.$$

Exercise 7. Let $f(x) = x^2 - 2x$, where f has the domain $x \geq 1$. Find a formula for f^{-1} , and then plot both f and f^{-1} .

Exercise 8. Let $f(x) = 5 - 4x$. Graph f and f^{-1} together. Evaluate $f'(x)$ at $x = 1/2$, evaluate $(f^{-1})'(x)$ at $x = f(1/2)$, and verify that $1/f'(f^{-1}(1/2)) = (f^{-1})'(1/2)$.

Exercise 9. Show that the function $f(x) = (1-x)^3$ has an inverse on the domain $(-\infty, \infty)$. Find a formula for the derivative of this inverse.

Exercise 10. Let $f(x) = \sqrt{x^2 + 6x}$, where f has the domain $x \leq -6$. Let g be the inverse of f . Compute $g'(4)$.