

Show all work. Arithmetic expressions do not need to be simplified in your final answer.

1. **(5 points)** Using the difference quotient, calculate the derivative of $f(x) = 2x - 5x^2$.

2. **(4 points)** Calculate $\frac{d^3}{dt^3} (3e^t - 2 \sin t + 5t^3 - 2t)$.

3. **(6 points)** If $g(u) = \frac{e^u + \sec u}{u^3 + \sqrt{u}}$, calculate $g'(u)$.

4. **(5 points)** For $y = x^3 \cot x$, compute $\frac{dy}{dx}$.

5. **(2 point bonus)** On the back of this page, find a *general* formula for $\frac{d^n}{dx^n} (e^x \sin x)$.