MATA 31 Calculus 1 winter 2024

Problem Set 3

March 3 - 10 on Crowdmark

Each question is 25 points.

1. (25) Prove that if f and g are differentiable at $x \in \mathbb{R}$, then

$$(f \times g)'(x) = f'(x)g(x) + f(x)g'(x)$$

2. (25) Find the equation of the tangent line of the function $f(x) = \sqrt{2x+7}$ at x=1 and use it to approximate $\sqrt{8.98}$

3. (25) Let a be real and let

$$f(x) = \begin{cases} x \sin \frac{1}{x}, & \text{for } x \neq 0 \\ a, & \text{for } x = 0 \end{cases}$$

   (a) (15) Find all a so that $f(x)$ is continuous and then prove that for all such a, f is indeed continuous at 0 using $\epsilon - \delta$ definition.