Math 108-03
Spring 2026
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Quiz 3 no calculator

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Score: ___/10

Problem 1: Find the following derivatives.

a. Find the derivative of $h(t) = et^3 + \frac{1}{2}\csc(t) - 5\tan(t) + e^2$.

$h'(t) = 3et^2 - \frac{1}{2}\csc(t)\cot(t) - 5\sec^2(t) + 0$

Score: /2

b. Find f' given $f(x) = \cos(x)(3x^2 - \frac{5}{x})$.

$f'(x) = -\sin(x)\left(3x^2 - \frac{5}{x}\right) + \cos(x)\left(6x + \frac{5}{x^2}\right)$

Score: /2

c. Find dg/dx given $g(x) = \dfrac{\sin(x) - x^3}{5\pi + \sqrt[3]{x}}$.

$$\frac{dg}{dx} = \frac{(\cos(x) - 3x^2)(5\pi + \sqrt[3]{x})) - (\sin(x) - x^3)(\frac{1}{3}x^{-2/3})}{(5\pi + \sqrt[3]{x}))^2}$$

Score: /2

Problem 2: Use the limit definition of the derivative to find $f'(a)$ given $f(x) = \sqrt{x+2}$.

$$f'(a) = \lim_{h\to 0}\frac{f(a+h) - f(a)}{h} = \lim_{h\to 0}\frac{\sqrt{a+h+2} - \sqrt{a+2}}{h}$$

$$= \lim_{h\to 0}\frac{\sqrt{a+h+2} - \sqrt{a+2}}{h} \times \frac{\sqrt{a+h+2} + \sqrt{a+2}}{\sqrt{a+h+2} + \sqrt{a+2}} = \lim_{h\to 0}\frac{\sqrt{a+h+2}^2 - \sqrt{a+2}^2}{h(\sqrt{a+h+2} + \sqrt{a+2})}$$

$$= \lim_{h\to 0}\frac{(a+h+2) - (a+2)}{h(\sqrt{a+h+2} + \sqrt{a+2})} = \lim_{h\to 0}\frac{h}{h(\sqrt{a+h+2} + \sqrt{a+2})} = \lim_{h\to 0}\frac{1}{\sqrt{a+h+2} + \sqrt{a+2}}$$

$$= \frac{1}{2\sqrt{a+2}} \qquad \text{DSP } h = 0$$

Score: /4