MTH 263, Quiz #3, Summer 2023 Name KEY

Instructions: Work the problems below as directed. Show all work. Clearly mark your final answers. Use exact values unless the problem specifically directs you to round. Simplify as much as possible. Partial credit is possible, but solutions without work will not receive full credit.

1. Use the table below to calculate the slope of the secant line between $P(4,2)$ and $Q(b, f(b))$ on the function $f(x) = \sqrt{x}$. Use that information to then estimate the slope of the tangent line at $P(4,2)$. Carry sufficient decimal places for the table, give an exact value for the tangent line slope.

a	f(a)	b	f(b)	m_sec
4	2	5	≈ 2.236068	≈ 0.236068
4	2	4.1	≈ 2.024846	≈ 0.248457
4	2	4.01	≈ 2.002498	≈ 0.249844
4	2	4.001	≈ 2.00025	≈ 0.249984
4	2	4.0001	≈ 2.000025	≈ 0.249998
4	2	4.00001	≈ 2.000002	0.25

$f'(4) = 0.25$

2. Find the indicated derivative of the given function.

a. $f'(x), f(x) = \sqrt{x} - x^3 = x^{1/2} - x^3$

$f'(x) = \frac{1}{2}x^{-1/2} - 3x^2 = \frac{1}{2\sqrt{x}} - 3x^2$

b. $f''(x), f(x) = 5x + \frac{1}{x^2} = 5x + x^{-2}$

$f'(x) = 5 - 2x^{-3}$

$f''(x) = 6x^{-4} = \frac{6}{x^4}$

c. $f'(x), f(x) = (x^2 + 2x - 5)(x^3 - 3x^2 + 2\sqrt[3]{x} - 6)$ do not FOIL out

$f'(x) = (2x+2)(x^3 - 3x^2 + 2x^{1/3} - 6) + (x^2+2x-5)(3x^2 - 6x + \frac{2}{3}x^{-2/3})$

d. $f'(x), f(x) = \frac{x^2+1}{x-2}$

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