New Jersey Institute of Technology
DEPARTMENT OF MATHEMATICAL SCIENCES
Math 111-029 Quiz 3

Your Name: Quiz Solutions PROF. ALLAIRE

1. Find the derivative with respect to x of the following functions:

+1 (a) $f(x) = x(x+2)$ $= x^2 + 2x$

$f'(x) = 2x + 2 = 2(x+1)$

+2 (b) $f(x) = \dfrac{\sqrt{x}+x^{1/3}}{x}$ $= \dfrac{x^{1/2}}{x} + \dfrac{x^{1/3}}{x} = x^{-1/2} + x^{-2/3}$

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

2. Find $f''(x)$, the second derivative of $f(x) = x^2 e^x$ with respect to x. (Please factor e^x from the final answer).

+3

$f(x) = x^2 e^x$

$f'(x) = x^2 e^x + 2x e^x = e^x(x^2+2x)$

$f''(x) = e^x(2x+2) + e^x(x^2+2x)$

$\boxed{f''(x) = e^x(x^2+4x+2)}$

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3. Find the equation of the tangent line of the function $y = f(x) = e^x$ at $x = 1$. Express your answer in slope-intercept form.

pt: $(1, e^1) = (1, e)$

Slope:

$f'(x) = e^x$

$f'(1) = e^1 = e = m$

Line: $y - e = e(x - 1)$

$y = ex$