

Score: _____ out of 10.

Math 201 - Quiz #3

Name: _____

key

1. Compute the derivative for each of the following. Full simplification is not necessary, but your final answer should not have any derivatives.

(a) $f(x) = 3x^4 - 2e^x + 3$

$$f'(x) = 3(4x^3) - 2(e^x) + 0$$

$$= 12x^3 - 2e^x$$

answer:

$$f'(x) = 12x^3 - 2e^x$$

(b) $g(t) = \pi + \ln(3) - 6$

$$g'(t) = 0$$

this is a constant

answer:

$$g'(t) = 0$$

(c) $y = \frac{e^x}{x^2 + 1}$

use quotient rule.

$$y' = \frac{(x^2 + 1) \frac{d}{dx} e^x - e^x (\frac{d}{dx} (x^2 + 1))}{(x^2 + 1)^2} = \frac{(x^2 + 1)e^x - e^x(2x)}{(x^2 + 1)^2}$$

answer:

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

$$\text{or } \frac{e^x(x^2 - 2x + 1)}{(x^2 + 1)^2}$$

(d) $y = e^x \sqrt{x} + x$

use product rule

$$y' = e^x \frac{d}{dx} (x^{1/2}) + \frac{d}{dx} (e^x) \sqrt{x} + \frac{d}{dx} (x)$$

$$= e^x (\frac{1}{2} x^{-1/2}) + e^x \sqrt{x} + 1$$

answer:

$$y' = e^x (\frac{1}{2} x^{-1/2}) + e^x \sqrt{x} + 1$$

$$\text{or } \frac{e^x}{2\sqrt{x}} + e^x \sqrt{x} + 1$$

2. Find an equation for the tangent line to $f(x) = \sqrt{x}$ through the point (4, 2).

$$f(x) = x^{1/2}$$

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

$$f'(4) = \frac{1}{2\sqrt{4}} = \frac{1}{2 \cdot 2} = \frac{1}{4} \leftarrow \text{slope}$$

point-slope eqn for tangent line:

$$y - f(4) = f'(4)(x - 4)$$

$$y - 2 = \frac{1}{4}(x - 4)$$

answer:

$$y - 2 = \frac{1}{4}(x - 4)$$

OR

$$y = \frac{1}{4}x + 1$$