KEY

You have ten minutes to complete this quiz.

1. Find the derivative of each function listed below.

   (a) $f(x) = x^3(e^x + 1)$

   $$f'(x) = 3x^2(e^x + 1) + x^3(e^x)$$

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

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

   (c) $f(x) = (x + 1)(x^2 + 1)(x^3 + 1)$

   (with labels g, h, j over the factors)

   $$f' = g'hj + gh'j + ghj'$$

   $$f' = (1)(x^2+1)(x^3+1) + (x+1)(2x)(x^3+1) + (x+1)(x^2+1)3x^2$$

2. Find the equation of the tangent line to $f(x) = \dfrac{x}{x^2 + 1}$ when $x = 1$.

   $$f(1) = \frac{1}{1^2 + 1} = \frac{1}{2} \qquad \text{point} : (1, \tfrac{1}{2})$$

   $$\text{slope} = f'(1) = \left. \frac{(x^2+1)(1) - x(2x)}{(x^2+1)^2} \right|_{x=1} = \frac{2-2}{4} = 0$$

   line:
   $$y - \tfrac{1}{2} = 0(x - 1)$$
   $$\text{or } y = \tfrac{1}{2}$$

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[1] You are excused to leave when you're finished with this quiz.