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) $f(x) = 5x^3 - 2e^x + 10$

   answer: $\boxed{f'(x) = 15x^2 - 2e^x}$

   (b) $g(t) = 2e + \ln(\pi) - 2$

   $\underbrace{\qquad\qquad}_{\text{Constant}}$

   answer: $\boxed{g'(t) = 0}$

   (c) $y = \dfrac{\sqrt{x}}{x^2+1} = \dfrac{x^{1/2}}{x^2+1}$

   quotient rule : $y' = \dfrac{(x^2+1)\frac{d}{dx}(x^{1/2}) - x^{1/2}(\frac{d}{dx}(x^2+1))}{(x^2+1)^2}$

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

   answer:

   (d) $y = e^x(\sqrt[3]{x}) + 1 = e^x(x^{1/3}) + 1$

   product rule. $y' = e^x \frac{d}{dx}(x^{1/3}) + \frac{d}{dx}(e^x)x^{1/3} + 0$

   $y' = \boxed{e^x(\frac{1}{3}x^{-2/3}) + e^x(x^{1/3})}$

   answer:

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

   $f(x) = \sqrt{x} = x^{1/2} \longrightarrow f'(x) = \frac{1}{2}x^{-1/2} = \dfrac{1}{2\sqrt{x}}$ so $f'(4) = \dfrac{1}{2\sqrt{4}} = \dfrac{1}{2\cdot 2} = \dfrac{1}{4}$

   $\left.\begin{array}{l} \text{point: } (4,2) \\ \text{slope : } m = 1/4 \end{array}\right\}$ $\boxed{y - 2 = \frac{1}{4}(x-4)}$ $y = \frac{1}{4}x - 1 + 2$

   answer: $\boxed{y = \frac{1}{4}x + 1}$