NAME_____

Show work and write clearly.

For #1- 12, find the derivative. Simplify your answer.

1. (7 pts.) $y = \dfrac{1}{2}\left(x^4 + 7\right)$

2. (7 pts.) $y = \dfrac{\sin x \sec x}{1 + x \tan x}$

3. (7 pts.) $y = \dfrac{x^2 e^x + 1}{5}$

4. (7 pts.) $y = \sqrt[3]{x} - \dfrac{1}{x}$

5. (7 pts.) $y = \left(x^3 + 7x^2 - 8\right)\left(2x^{-3} + x^{-4}\right)$

6. (7 pts.) $y = \dfrac{3x^2}{5x - 3}$

7. (7 pts.) $y = \left(2x^7 - x^2\right)\left(\dfrac{x - 5e^x}{x + 1}\right)$

8. (7 pts.) $y = 2 \cos x - 3 \sin x$

9. (7 pts.) $y = \dfrac{\csc x}{\tan x}$

10. (7 pts.) $y = x^3 \tan x - x \cos x$

11. (7 pts.) $y = \dfrac{7 - 5\sqrt{x}}{x^6}$

12. (7 pts.) $y = \sin^2\left(\dfrac{1}{x}\right)$

13. (5 pts.) At what point(s) does the graph of the equation $y = x^4 - x^3 - x^2$ have a horizontal tangent line?

14. (6 pts.) a. Use the definition of the derivative at a point to find the derivative $f'(a)$ of
$f(x) = x^3 + 5$ at $a = -2$.
   b. Find the equation of the tangent line to $f(x)$ at $x = -2$.

15. (5 pts.) For what value(s) of x is $f(x)$ not differentiable. EXPLAIN.