

Name: _____

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Circle one: Faudree (F01) | Bueller (F02) | VanSpronsen (UX1)

25 points possible. No aids (book, calculator, etc.) are permitted. You need not simplify, but show all work and use proper notation for full credit.

1. [15 points] Differentiate the following. Use proper notation to indicate your answer.

a. $h(x) = \frac{\cos(x)}{1-x^2}$

b. $f(x) = (2x-5)^3(x^2+4)^2$

c. $g(x) = 10^{2\tan x}$

d. $f(t) = \sqrt{2t - \sin^3 t}$

e. $f(x) = x^3 e^{-1/x}$

2. [6 points] The amount of water in a tank t minutes after it has started to drain is given by

$W = 10(t - 10)^2$ gal. Be sure to include proper units in your answers.

a. How many gallons of water are in the tank at time $t = 0$?

b. At what rate is the water running out at the end of 5 minutes?

c. What is the average rate at which the water flows out during the first 5 minutes?

3. [4 points] Find an equation of the tangent line to the curve $y = \frac{8}{4 + \tan x}$ at the point where $x = 0$.