

# MAT 125- PRACTICE Exam #1-Fall 2017

NAME: \_\_\_\_\_

TA NAME: \_\_\_\_\_

\*Each numbered question is worth 20 points.

1. For all parts in question #1  $f(x) = \sqrt[4]{x}e^x$

a.) Find the slope of the tangent line on  $f$  at  $x=1$ .

b) Write an expression for  $f'(x)$  in terms of a limit using the definition of the derivative but do NOT simplify.

c) Write the equation of the tangent line on  $f$  at  $x=1$ .

d) Does  $f$  have a horizontal tangent line at  $x = 0$ ? Explain!

2) Find  $\frac{dy}{dx}$

$$y = (\tan 21x)^{\ln 3x}$$

3) Let  $f(x) = e^x - \text{Arc tan } x$

a) Find  $f'(0)$

b) Find the derivative of  $xf(x)$

c) Find the derivative of  $f(\sin x)$

4a) Find  $f'(x)$

$$f(x) = \frac{1}{112}x + \frac{1}{\pi} - e \cos x - \tan 3$$

4b) Find  $\frac{dy}{dx}$

$$y = \frac{4e^x - x^4}{\sec x - 7 \cot x}$$

5) A conical water tank with vertex down has a radius of 10 ft at the top and is 24 feet high. If the water flows into the tank at a rate of  $20 \text{ ft}^3/\text{min}$ , how fast is the depth of the water increasing when the water is 16 ft deep?