Math 34A Winter 2020
Old Midterm 3 #3

No calculators

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Excellence Bonus ____ / 1

Score ____ / 34

Put answers in the boxes provided. **Show high quality work** for **all answers**. Points may be awarded for this.

TA: ☐ Garo ☐ Sam ☐ Trevor

Section Time: ☐ 8am ☐ 6pm ☐ 5pm ☐ 7pm

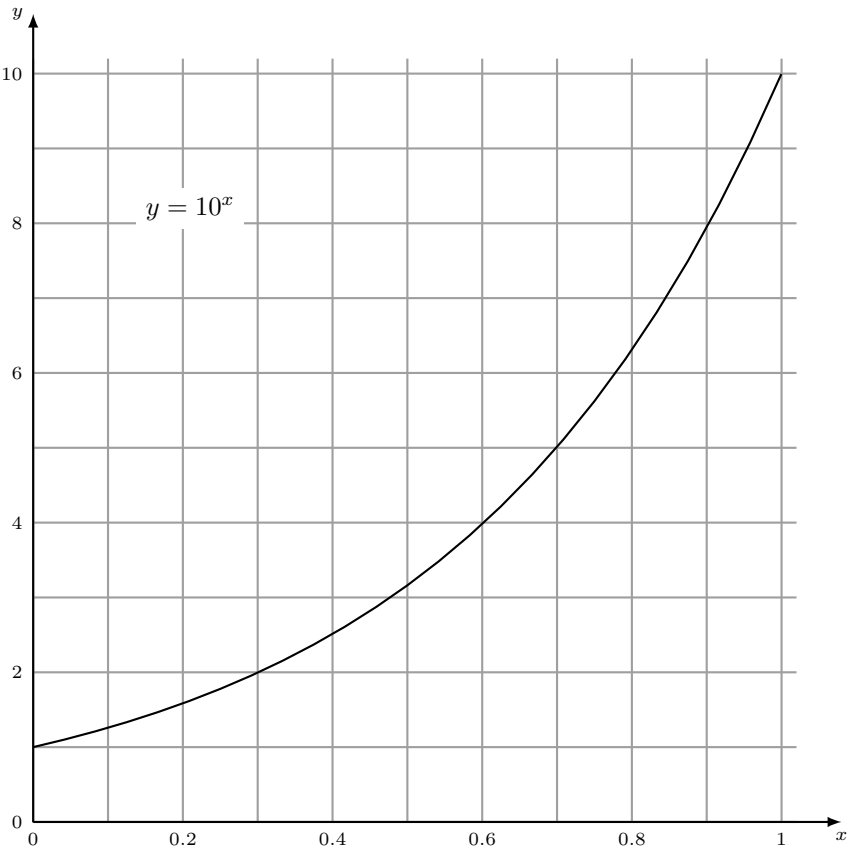
1. [/6] Use the graph given to find

(a) $\log(6.34 \times 2) =$

(b) Solve $10^x = 0.075$ Then $x =$

(c) Draw the tangent line to the graph at $x = 0.5$ and find its slope.

slope =



2. [/6] Find the following derivatives. Simplify your answers.

(a) $\dfrac{d}{dx}\left(3x^6 - 2x^2 + 7\right) =$ $\boxed{}$

(b) $\dfrac{d^2}{dx^2}\left(9x + 5e^{2x}\right) =$ $\boxed{}$

(c) If k is a constant, then $\dfrac{d}{dx}\left(8\sqrt{x} + kx + k^2\right) =$ $\boxed{}$

3. [/4] A water tank has a square base. The length of a side of the square is 2 meters. The depth of water in the tank after t hours is $h(t)$ meters; we are told that $h(0) = 9$ and $h'(0) = -2$. Use the tangent line approximation to find...

(a) How many cubic meters of water are in the tank after 2 hours?

$\boxed{}$ meters^3

(b) How many hours until the tank is empty?

$\boxed{}$ hours.

4. [/8] This question is about the function

$$y = 3x^2 + 7x + 2$$

(a) What is the slope of the graph at $x = 1$?

slope = $\boxed{}$

(b) What is the equation of the tangent line to the graph at $x = 1$? (Please give answer in the form $y = mx + b$.)

$y =$ $\boxed{}$

(c) What is the y-coordinate of the point on the graph where the slope is zero?

$y =$ $\boxed{}$

(d) For what value of x does the graph have slope 11?

$x =$ $\boxed{}$

5. [/10] The height of a rocket above the ground in meters after t seconds is $h(t) = 700 - 3t^2 + 50t$. It lands on top of an office block after 10 seconds.

(a) What was the velocity of the rocket after t seconds?

velocity = ☐ m/s

(b) What was the acceleration of the rocket after t seconds?

acceleration = ☐ m/s^2

(c) What was the initial speed of the rocket?

initial speed = ☐ m/s

(d) After how many seconds was the speed of the rocket zero? (Leave your answer as a fraction.)

After ☐ seconds

(e) How high above the ground was the rocket after 2 seconds?

height = ☐ meters