Math 34A Winter 2020
Old Midterm 3 #4

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

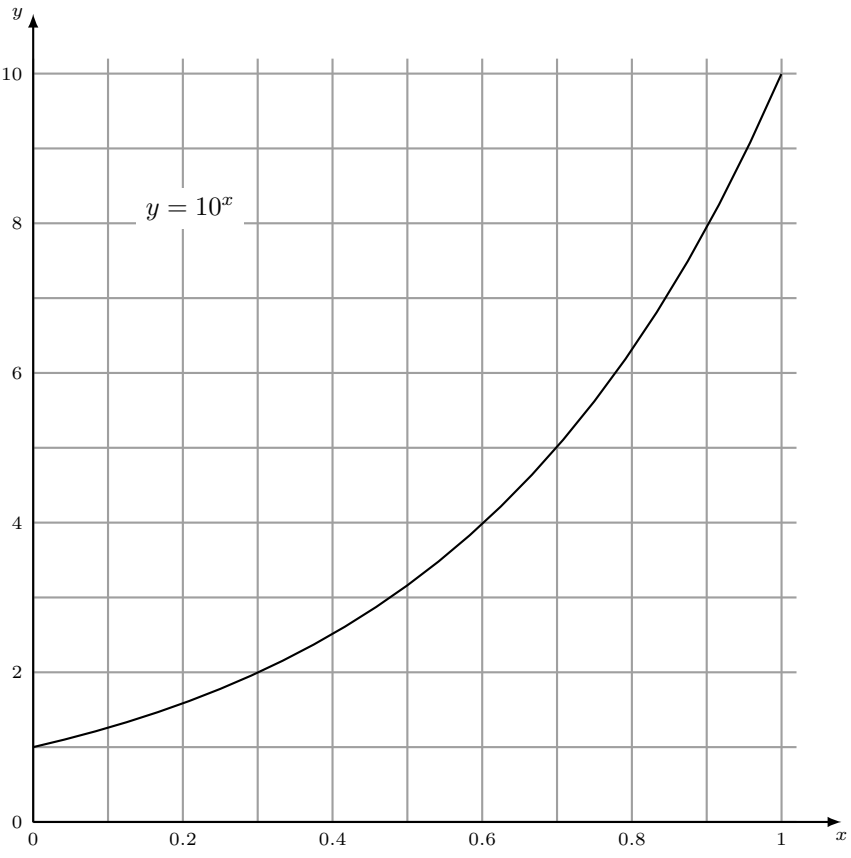
1. [/6] Use the graph given to find

(a) $\log(6.3 \times 3.2) =$

(b) Solve $10^x = 10/73$. Then $x =$

(c) Find a value c so that the average rate of change of 10^x between $x = 0.3$ and $x = c$ is 7.

$c =$



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

(a) $\dfrac{d}{dx}\left(5x^4 - 4x + 2\right) =$ $\square$

(b) $\dfrac{d^2}{dx^2}\left(2e^{5x} - 3x^2\right) =$ $\square$

(c) If k is a constant, then $\dfrac{d}{dx}\left(x^e + e^x + e^k\right) =$ $\square$

3. [/4] The depth of a certain lake decreases with time as runoff brings silt in to fill the lake. Suppose $f(t)$ gives the depth, in meters, of the lake t years after the year 2010. Suppose $f(7) = 100$ and $f'(7) = -3$. Use the tangent line approximation to estimate...

(a) The expected depth of the lake in the year 2020.

depth = $\square$ meters

(b) When (what year) will the depth of the lake be 70 meters?

In the year $\square$.

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

$$f(x) = x^3 + 3x^2 + 4x + 3$$

(a) What is the slope of the graph $y = f(x)$ at $x = -2$?

slope = $\square$

(b) What is the equation of the tangent line to the graph at $x = -2$? (Please give answer in the form $y = mx + b$.)

$y =$ $\square$

(c) On what interval is the graph of $y = f(x)$ concave up?

On the interval $\square$ $< x <$ $\square$.

(d) For what value(s) of x does the graph have slope 4?

$x =$ $\square$

5. [/10] The height of a rocket above the ground in meters after t seconds is $h(t) = 400 + 20t - 5t^2$.

(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 velocity 15 m/s?

After ☐ seconds

(e) What was the average speed of the rocket between $t = 0$ and $t = 2$ seconds?

average speed = ☐ m/s