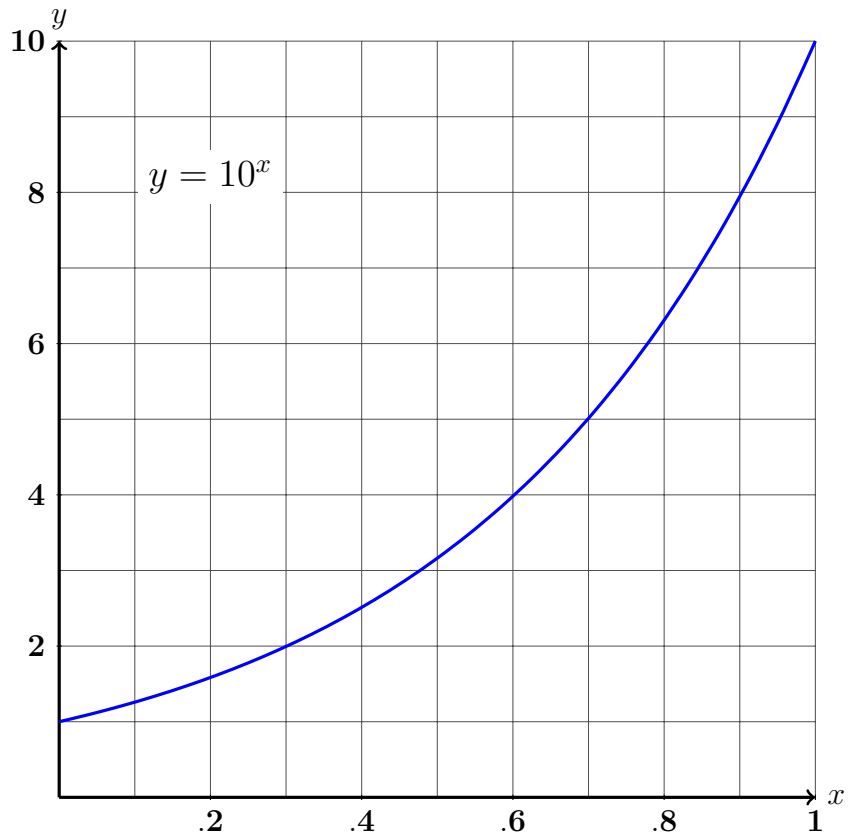
Name:	
Perm:	

Math 34A Final Exam, Spring 2022

1. (*15 pts*) Please use the graph below to estimate your answers.



(a) Find log(2512)

$\log(2512) \approx$ ☐

(b) Find $\log(2^{10})$

$\log(2^{10}) \approx$ ☐

(c) Approximate a solution for x in the equation $2^{3x-5} = 5^3$

$x \approx$ ☐

2. (*6 pts*) For this problem, k, m, and b are constant values. Find $\dfrac{d}{dx}\left(2ke^{3kx} + mx + b\right)$ and simplify your answer.

$\dfrac{d}{dx}\left(2ke^{3kx} + mx + b\right) =$ [ ]

3. (*10 pts*) This question is about the graph of the function

$$f(x) = -x^2 + 8x + 16.$$

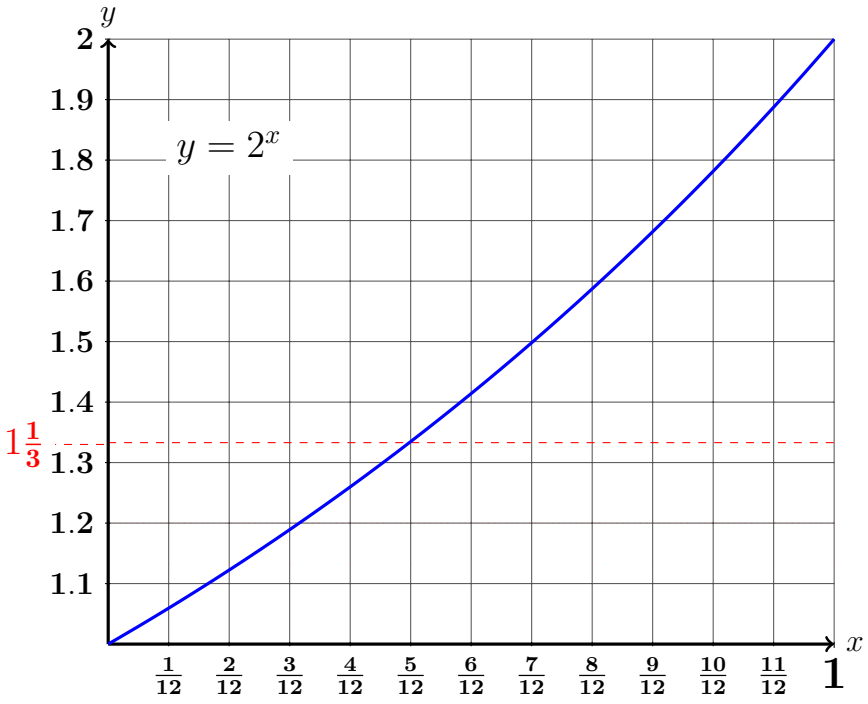
(a) When does f achieve its highest value?

When $x =$ [ ]

(b) Write the equation of the tangent line at $x = 0$ in the form $y = mx + b$.

$y =$ [ ]

4. (*7 pts*) For each part of problem (4) please use the graph below to estimate your answers.



(a) (*3pts*) Find a solution for $2^x = \frac{4}{3}$

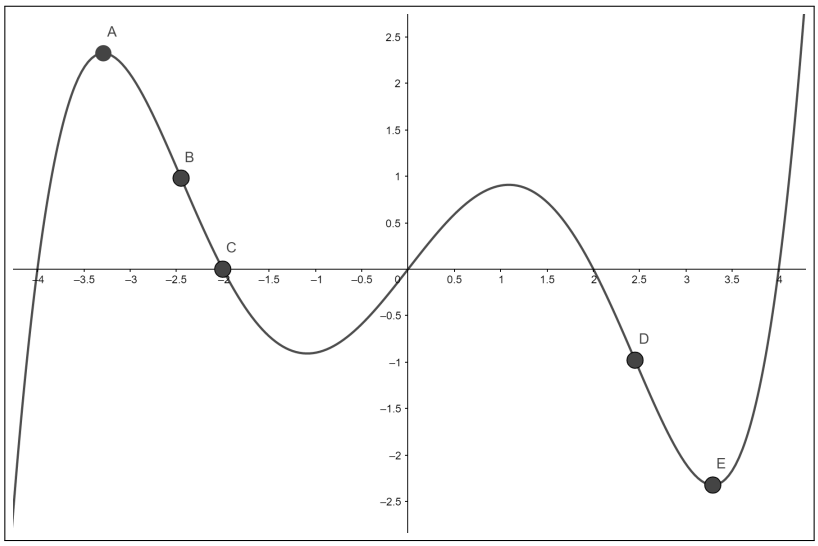
$x \approx$ ☐

(b) (*4pts*) The SoCal Burger restaurant chain has been very popular since they first opened their first location in Santa Barbara a few years ago and they now have hundreds of locations. In fact, over the last twelve months the number of locations has doubled! In order to set a world record, they just need to grow 50% over the next year. Assuming that their steady, exponential growth from last year continues over the next year, how many months would it take?
(Hint, the answer is **not** 6 months).

A model that might be helpful: $y = A \cdot 2^t$, where y is the number of locations t years from now and A is the current number of locations.

$\approx$ ☐ months

5. (*9pts*) Below is the graph of a funtion $g(x)$ with five labeled points, A, B, C, D, and E. Identify a point where $g''(x) < 0$, a point where $g''(x) = 0$, and a point where $g''(x) > 0$.



$g''(x) < 0$	$g''(x) = 0$	$g''(x) > 0$

6. (*10pts*) For this problem, $f(x) = (x^2 + 3)(x + 2)$.

(a) $f'(x) =$

(b) $f''(x) =$

7. (*15pts*) Jack Johnson* will be playing at the Santa Barbara Bowl next fall. He gives you 100 concert tickets, asking you to sell them on campus for a charity and to give away any left-over tickets. The price is up to you, but you need to sell them all at the same price. If the price you set is \$20 each then you would sell all 100 tickets. For each dollar you decide to increase the price, the number of tickets you could sell would decrease by 2.

   (a) If your ticket price is $\$(20 + x)$, how many tickets would you be able to sell?

   tickets

   (b) What is the total amount of money (in terms of x) you would receive for selling those tickets? You do not need to simplify your answer for this part.

   \$

   (c) What is the maximum amount of money you could receive from selling tickets?

   \$

*Maybe this story isn't so far-fetched. Jack Johnson is a UCSB alumnus and after he heard about a tragic event that happened here a few years ago he came and played a free concert in front of Storke Tower. He also fund-raises frequently for people in need in this area, including a benefit a couple months ago for victims of the Thomas fire.