Name:	
Perm:	

 ${\bf Math~34A~Midterm~3,~Summer~2022}$

(100 pts total)

1.	. Use the log table provided with this exam to answer the following questions: (a) $(4 \ pts)$ Find $\log(10) + \log(0.316)$.	
	(b) $(4 pts)$ If $\log(y) = 6.3$, then find y .	
	y =	
	(c) (4 pts) Find the average rate of change of 10^x between $x = 0.7$ and $x = 0.9$.	

$$\frac{\Delta y}{\Delta x} =$$

2. Compute the following derivatives.

(a)
$$(4 pts) \frac{d}{dx} (3x^5 - 2x^2 - 14\sqrt{x}) =$$

(b)
$$(4 pts) \frac{d}{dx} (4x^2 + 5e^{2x} - 5e^{3x}) =$$

(c) (4 pts) Consider the function

$$f(x) = \frac{a}{\sqrt[3]{x}} - \frac{b}{(e^x)^2}$$

where a and b are constants. Find f'(1).

$$f'(1) =$$

3	This	question	is	about	the	graph	of	the	function	1
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$$f(x) = 2x^3 + 3x^2 - 12x + 172.$$

(a)
$$(5 pts)$$
 What is the slope of the graph at $x = 0$?

(b) (5 pts) What is the equation of the tangent line to the graph at x = 2? Use the form y = mx + b.

$$y =$$

(c) (5 pts) For which x value(s) does the graph have 0 slope?

$$x =$$

(d) (5 pts) For which x values is the graph y = f(x) concave down?

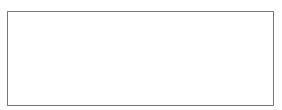


4.	A	large	Nerf	ball	is	launched	upward	${\rm from}$	the	top o	of a	cliff.	Its	height	(in	meters)	t
	se	conds	after	laun	ch	is modele	d by the	equa	tion								

$$h(t) = -5t^2 + 30t + 50.$$

(In this problem we are ignoring horizontal movement.)

(a) (7 pts) Find the function which gives the velocity of the ball after t seconds.



(b) (7 pts) What is the initial height of the ball?

$$h =$$
 m

(c) (7 pts) What is the acceleration of the ball after 5 seconds?

(d) (7 pts) When does the ball stop rising and begin to fall? (Hint: What would the ball's speed be at that moment?)

(e) (7 pts) What was the ball's maximum height?

$$h =$$
 m

5. A bacteria colony on a petri dish is growing in the shape of a circle. After radius of the circle is $t^2 + 2t$ mm.	t days, the
(a) (6 pts) What is the area of the circle after t days?	
4(1)	2
A(t) =	mm^2
(b) $(7 pts)$ How quickly is the area of the circle growing after t days?	
	1
A'(t) =	$\mathrm{mm}^2/\mathrm{day}$
	1
(c) (8 pts) As time goes by will the area of the circle grow faster, slower, area grow at a constant rate? Why? (Use calculus to justify your answ	
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