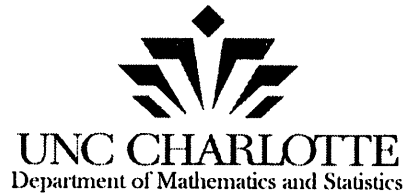


MATH 1241 – CALCULUS I

COMMON FINAL EXAMINATION

FALL 2018



Last Name: _____ (Please PRINT)	First Name: _____ (Please PRINT)	
Student ID #: _____	Instructor: _____	Section: _____

For Grading Use Only:

Problem	1	2	3	4	5
Grade	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Out of	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Free Response Score					<input type="text"/>

PART III

- Part III consists of 5 free response problems. After you have handed in part I and your exam proctor announces that calculator may be used, you may use your calculator on this part of the exam. (Texas Instruments 83 or 84 or equivalent models of other brands are allowed. TI Inspire, TI 89 or equivalent calculators are NOT allowed on this exam.)
- Please show all of your work on the problem sheet provided. Work that is done on scratch paper or any other sheets will not be graded.
- You may use your calculator to check your answers, but complete justification must be shown for each problem. This includes all graphs, calculations and references to supporting theorems.
- Make sure that your name appears on each page of the test booklet.
- At the end of the exam you must hand in all test material including the test booklets, OpScan sheets and scratch paper.

1. Suppose f is a differentiable function with the following table of values:

x	$f(x)$	$f'(x)$
1	2	5
2	4	3
4	5	-1
8	3	2

(a) Let $g(x) = x^2 f(x)$. Evaluate $g'(4)$.

(b) Let $h(x) = \frac{f(x)}{2x+1}$. Evaluate $h'(2)$

(c) Let $k(x) = 3x + f(x^2)$. Evaluate $k'(2)$

2. A function f satisfies the conditions below.

The domain of f is all x except $x = 1$.

$x = 1$ is a vertical asymptote.

$$\lim_{x \rightarrow \infty} f(x) = 1,$$

$$f(-2) = 0, f(-1) = 1, f(0) = 2.$$

$$f'(x) > 0 \text{ on } (-2, 0)$$

$$f'(x) < 0 \text{ on } (-\infty, -2) \cup (0, 1) \cup (1, \infty).$$

$$f''(x) > 0 \text{ on } (-\infty, -1) \cup (1, \infty)$$

$$f''(x) < 0 \text{ on } (-1, 1)$$

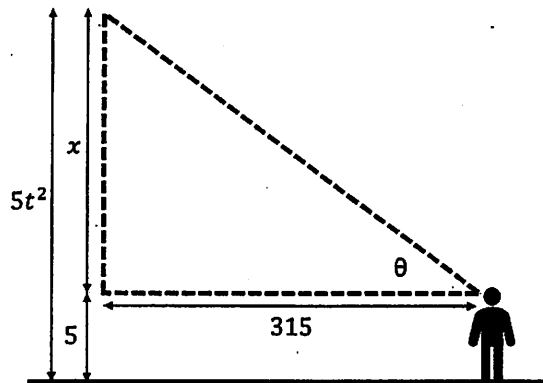
(a) List any horizontal asymptotes for f

(b) List the x -coordinates of any relative maxima for f
If none, write none.

(c) Sketch a graph of the function f .

3. Use the formula $f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$ to find $f'(3)$ for $f(x) = 2x^2 + 4x + 1$. No credit will be given if you do not use the formula above and show your work.

4. A rocket is fired straight up from ground level and reaches a height of $5t^2$ feet after t seconds. An observer 315 feet away watches the rocket rise. If the observer's eyes are 5 feet above ground level, how fast is the angle θ in the diagram below changing (find $\frac{d\theta}{dt}$ in radians per second) when the angle θ is $\pi/4$ radians?



5. Find the coordinates (x, y) of the point on the curve $y = 2\sqrt{x}$ that is closest to the point $(2, 8)$. Recall that the distance between two points (x_1, y_1) and (x_2, y_2) is $D = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$. If you minimize D^2 it will also minimize D .