Math 124 Section G Online, Fall 2019 Midterm I

October 22, 2019

Name_____

Student Number_____

Seat Number_____

Instructions.

- These exams will be scanned. **Please write your name and student number clearly for easy recognition.**
- There are 4 questions. The exam is out of 40 points.
- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting.
- You can only use a Ti-30x IIS calculator. Unless otherwise stated, you have to give exact answers to questions. ($\frac{2\ln 3}{\pi}$ and $1/3$ are exact, 0.699 and 0.333 are approximations for the those numbers.)
- **Show your work**. If I cannot read or follow your work, I cannot grade it. **You may not get full credit for a right answer if your answer is not justified by your work.** If you continue a question on the last page, make a note for me.

Question	points
1	
2	
3	
4	
Total	

1. (12 points) Evaluate the following limits. Show the algebra work where applicable. Your answer must be one of DNE, ∞, $-\infty$ or a number.

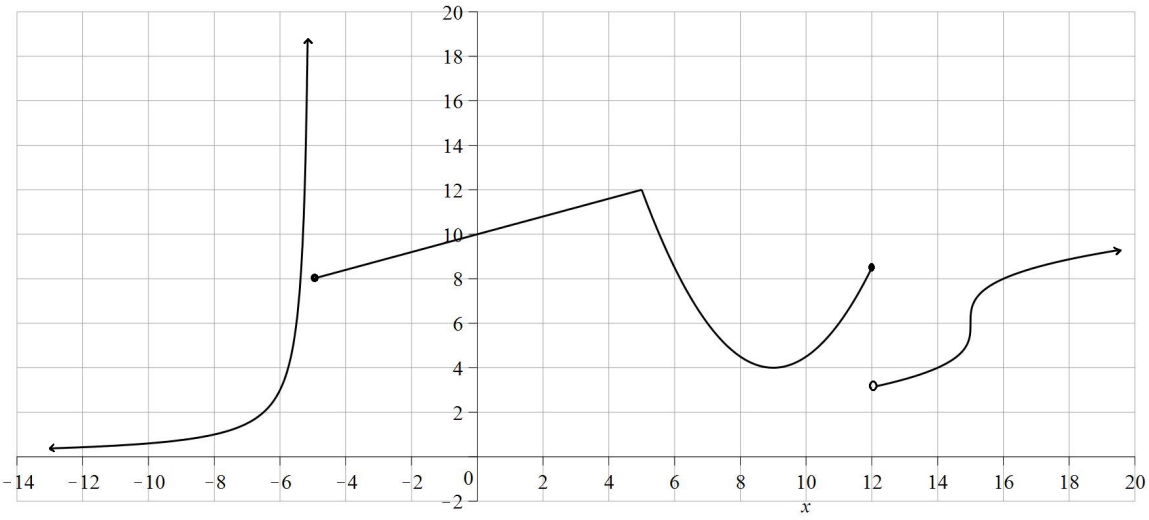
(a) $\lim_{x \to 11} \left(\dfrac{x^2 - x - 132}{x^2 - x - 110} \right)$

(b) $\lim_{x \to -\infty} \left(\dfrac{3x + 2}{\sqrt{5x^2 + 1}} \right)$

(c) $\lim_{x \to 2^+} \left(\dfrac{1}{x^2 - 4} - \dfrac{1}{x^2 - 2x} \right)$

(d) $\lim_{h \to 0} \dfrac{e^{h + \ln 3} - 3}{h}$

2. (11 points) The following is the graph of $y = f(x)$ with domain all real numbers. For limit questions your answer must be one of DNE, ∞, $-\infty$ or a number. In the graph below $f(-5) = 8$ and $f(12) = 8.5$.



(a) $f'(9) =$

(b) $f''(2) =$

(c) $\lim_{x \to 12^+} f(x) =$

(d) List all the intervals where the derivative $f'(x)$ is negative.

(e) List all the values of x where the derivative $f'(x)$ doe not exist.

(f) $\lim_{h \to 0^-} \dfrac{f(5+h) - 12}{h} =$

(g) $f(3.17) =$

(h) $\lim_{h \to 0^-} \dfrac{f(5+h) - 12}{h} =$

(i) $\lim_{h \to 0} \dfrac{f(-5+h) - f(-5)}{h} =$

3. Answer the following.

(a) (4 points) Use the limit definition of the derivative to find the derivative of $f(x) = \frac{1}{\sqrt{x+1}}$.

(b) (5 points) Find the x-intercept for the equation of the tangent line to $f(x) = xe^x - \frac{3}{x^2}$ at the point where $x = 1$.

4. (8 points) Find the equations of the two tangent lines to $f(x) = \dfrac{2x+3}{x-4}$ which pass through the point $(1, 13)$.