NAME:

Instructions: The exam questions are closely related to the homework and to the examples shown in class. Make sure you review your WeBWorK assignments.
For more practice you are strongly encouraged to do the suggested homework from the textbook.

OpenLab: Please register for the OpenLab if you don't have an OpenLab account yet:
https://openlab.citytech.cuny.edu/
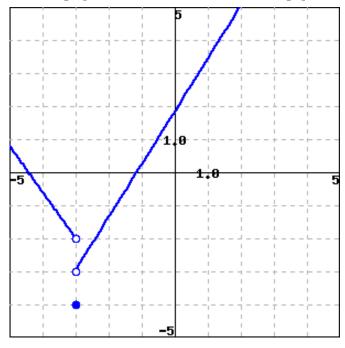This is a very quick process once you know how to access your City Tech email.
Once you are registered please visit our class site and click "join" (below the picture):
https://openlab.citytech.cuny.edu/groups/mat1475-calculus-i-fall-2019/
(you need to login to OpenLab to be able to join).
Solutions to this review sheet and other important documents will be posted on this site.

1. Use the graph below to answer the following questions.

a) $\lim\limits_{x \to -3^-} f(x) =$

b) $\lim\limits_{x \to -3^+} f(x) =$

c) $\lim\limits_{x \to -3} f(x) =$

d) $f(-3) =$

e) Is f continuous at $x = -3$? Justify your answer precisely.

f) $\lim\limits_{x \to 0} f(x) =$

g) Is f continuous at $x = 0$? Justify your answer precisely.

2. Given that $\lim\limits_{x\to 2} f(x) = 4$ and $\lim\limits_{x\to 2} g(x) = -3$, find $\lim\limits_{x\to 2}(5f(x) - 2g(x))$.

3. a) Find the derivative of $f(x) = 5x^2 - 2x + 4$ using the **definition** (the formula with limit).

   b) Find the equation of the tangent line to $f(x) = 5x^2 - 2x + 4$ at the point $(-1, 11)$.

4. Evaluate the following limits algebraically. Show your work. If the limit is not a number write "does not exist".

   a) $\lim\limits_{x\to 3} 6$

   b) $\lim\limits_{x\to -2} 3x^2 - 7x - 4$

   c) $\lim\limits_{x\to 3} \dfrac{x-3}{x-3}$

   d) $\lim\limits_{x\to 3} \dfrac{x-3}{x+3}$

   e) $\lim\limits_{x\to 3} \dfrac{x+3}{x-3}$

   f) $\lim\limits_{x\to -3} \dfrac{x+3}{x-3}$

   g) $\lim\limits_{x\to \infty} \dfrac{x^2+3}{x-3}$

   h) $\lim\limits_{x\to \infty} \dfrac{x+3}{x-3}$

   i) $\lim\limits_{x\to \infty} \dfrac{x+3}{x^2-3}$

   j) $\lim\limits_{x\to -\infty} \dfrac{x-6x^2-3}{x^2-3}$

5. Given the function $f(x) = \dfrac{2x^2-32}{x^2-2x-8}$.

   a) Find the intervals where f is continuous. Write the answer in interval notation.

   b) Evaluate $\lim\limits_{x\to 2} f(x)$.

   c) Identify the horizontal and vertical asymptotes of the function **by calculating the appropriate limits**.

   d) Sketch the graph of the function. Graph and label the asymptotes.

6. Identify the horizontal and vertical asymptotes of the function $f(x) = \dfrac{3}{4-x^2}$ **by calculating the appropriate limits**.

7.
$$f(x) = \begin{cases} x^3 - x & x < 1 \\ x - 2 & x \geq 1 \end{cases}$$

   Is f continuous at $x = 0$? Is f continuous at $x = 1$? Justify your answer precisely.

8.
$$f(x) = \begin{cases} x^3 - x & x < 1 \\ x + C & x \geq 1 \end{cases}$$

   For which value of C is f continuous at $x = 1$?