

MAT 1475/D608 - Spring 2020
Review for Exam 1

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.

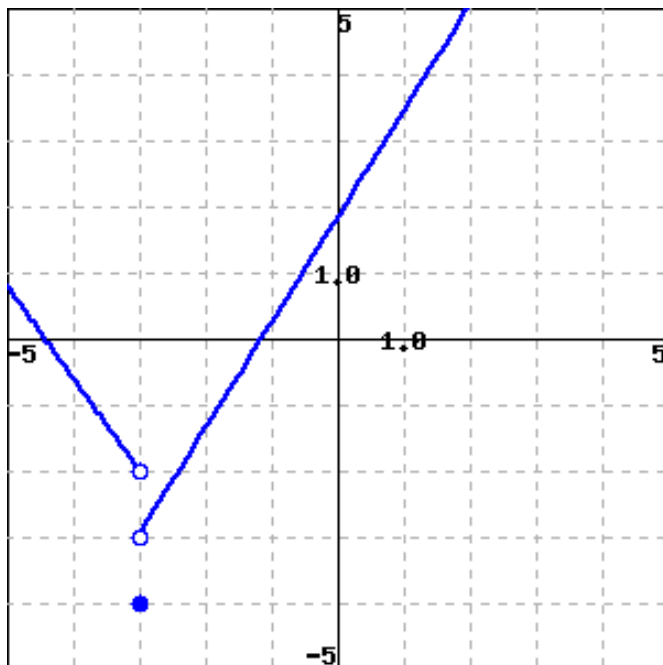
Once you are registered please visit our class site and click "join" (below the picture):

<https://openlab.citytech.cuny.edu/groups/mat-1475-calculus-1-spring-20-ghezzi/>

(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) $\lim_{x \rightarrow -3^-} f(x) =$

b) $\lim_{x \rightarrow -3^+} f(x) =$

c) $\lim_{x \rightarrow -3} f(x) =$

d) $f(-3) =$

e) Determine the most accurate statement:

1. $f(x)$ is continuous at $x = -3$.
2. $f(x)$ is not continuous at $x = -3$ because $f(-3)$ is undefined.
3. $f(x)$ is not continuous at $x = -3$ because $\lim_{x \rightarrow -3} f(x)$ does not exist.
4. $f(x)$ is not continuous at $x = -3$ because $f(-3)$ and $\lim_{x \rightarrow -3} f(x)$ exist, but are not equal.

f) $\lim_{x \rightarrow 0} f(x) =$

g) Determine the most accurate statement:

1. $f(x)$ continuous at $x = 0$.
2. $f(x)$ is not continuous at $x = 0$ because $f(0)$ is undefined.
3. $f(x)$ is not continuous at $x = 0$ because $\lim_{x \rightarrow 0} f(x)$ does not exist.
4. $f(x)$ is not continuous at $x = 0$ because $f(0)$ and $\lim_{x \rightarrow 0} f(x)$ exist, but are not equal.

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

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 and **make sure you use correct notation**. If the limit is not a number write “does not exist”.

a) $\lim_{x \rightarrow 3} 6$

b) $\lim_{x \rightarrow -2} 3x^2 - 7x - 4$

c) $\lim_{x \rightarrow 3} \frac{x - 3}{x - 3}$

d) $\lim_{x \rightarrow 3} \frac{x - 3}{x + 3}$

e) $\lim_{x \rightarrow 3} \frac{x + 3}{x - 3}$

f) $\lim_{x \rightarrow -3} \frac{x + 3}{x - 3}$

5. Given the function $f(x) = \frac{2x^2 - 32}{x^2 - 2x - 8}$, evaluate the following limits algebraically. Show your work and **make sure you use correct notation**. If the limit is not a number write “does not exist”.

a) $\lim_{x \rightarrow 2} f(x)$.

b) $\lim_{x \rightarrow -2} f(x)$.

c) $\lim_{x \rightarrow 4} f(x)$.

6.

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

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

7.

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

For which value of C does $\lim_{x \rightarrow 1} f(x)$ exist?

8. Find the derivatives of the following functions

(a) $f(x) = 5x^9$.

(b) $f(x) = 3^6$.

(c) $f(x) = \sqrt[3]{x^2}$.

(d) $f(x) = x + 11$.

(e) $f(x) = \frac{1}{x^8}$.

(f) $f(x) = x^4 + \frac{1}{\sqrt{x}} + \frac{1}{x^4}$.

(g) $f(x) = \frac{x}{5}$.

(h) $f(x) = \frac{x^2 - 4}{x^2 - 5}$. (Simplify your answer.)

(i) $f(x) = x^5(3x^4 - 2x)$. (Simplify your answer.)

9. Given that $f(2) = 5$, $f'(2) = 2$, $g(2) = -3$, $g'(2) = 4$, find $h'(2)$ for each function h given below:

a) $h(x) = 3f(x)$.

b) $h(x) = f(x)g(x)$.

c) $h(x) = \frac{f(x)}{g(x)}$.

d) $h(x) = f(x) - 2g(x) + 3$.