

New York City College of Technology  
MAT 1375/D575 - Spring 2019  
Review for Exam 3

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.

Solutions will be posted under "Files": <https://openlab.citytech.cuny.edu/groups/mat-1375-prec calculus-ghezzi-spring-2019/>

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1. Given  $y = 2 \sin(3x - \pi)$ , state the amplitude, period and phase shift, and then sketch one complete cycle of the graph. Label all maxima, minima and  $x$ -intercepts.
2. Given  $y = -5 \cos(x + \frac{\pi}{2})$ , state the amplitude, period and phase shift, and then sketch one complete cycle of the graph. Label all maxima, minima and  $x$ -intercepts.
3. Condense the following expression into a single logarithm by applying the properties of logarithms:  $-2 \log x + \frac{1}{2} \log y - 4 \log z$ .
4. The population of a country grows exponentially at a rate of 1% per year. If the population was 35.7 million in the year 2010, then what is the population size of this country in the year 2015? (Round your answer to one decimal.) In what year will the population be double?
5. In 2012, the initial amount of a radioactive substance is 200 grams and is decreasing exponentially at a yearly rate of 12%.
  - a) Find the amount of the radioactive substance in year 2019.
  - b) In what year will there be 50 grams left?
6. Solve the equation  $\log_3(x) + \log_3(x - 8) = 2$ .
7. Find the domain, asymptotes, and  $x$ -intercepts of the function  $f(x) = -\log(3 - 2x)$ . Sketch its graph.
8. Let  $u = \ln x$ ,  $v = \ln y$ ,  $w = \ln z$ , where  $x, y, z > 0$ . Write the expression  $\ln \sqrt{\frac{xy^3}{\sqrt{z}}}$  in terms of  $u$ ,  $v$  and  $w$ .
9. Given that  $\tan(\alpha) = -5/12$  and  $\alpha$  is in quadrant 2, find the exact values of  $\sin(2\alpha)$  and  $\cos(2\alpha)$ .
10. Find all exact solutions in radians.
  - a)  $\tan(x) = \sqrt{3}/3$
  - b)  $\cos(x) = -1$
  - c)  $\sin(x) = -\sqrt{3}/2$
  - d)  $2 \cos^2(x) = \cos(x)$
  - e)  $2 \sin^2(x) + \sin(x) - 1 = 0$
11. Solve the equation  $3 * e^{(2x+7)} = 63$ . First find the exact answer, then approximate the answer to the nearest hundredth using the calculator.