

New York City College of Technology  
MAT 1475 - Spring 2020  
Review for Exam 2

NAME: \_\_\_\_\_

**Instructions:** The exam will cover Sections 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9.

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.**

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1. Find the derivatives of the following functions

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

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

(c)  $f(x) = e^6$ .

(d)  $f(x) = \cot(x)$ .

(e)  $f(x) = \cos^{-1}(x)$ .

(f)  $f(x) = \sin(5x)$ .

(g)  $f(x) = 3 + \cos(x) + \cos(3)$ .

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

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

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

(k)  $f(x) = x^x$ .

(l)  $f(x) = (12x^3 - 2x^5)^4$ .

(m)  $f(x) = \cos(x^4)$ .

(n)  $f(x) = \cos^4(x)$ .

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

(p)  $f(x) = \sin(x^2 + 5)e^{\cos x}$ .

(q)  $f(x) = \frac{5x^2}{\sin x}$ .

(r)  $f(x) = e^{x \sin x}$ .

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

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

- (u)  $f(x) = e^{-7x} \tan(3x)$ .
- (v)  $f(x) = \tan^{-1}(5x)$ .
- (w)  $f(x) = \ln(3x^2 + 7x + 5)$ .
- (x)  $f(x) = \sec(12x)$ .

2. Calculate the derivative of  $y$  with respect to  $x$  given that  $xe^y = 5xy + 4y^4$ .
3. Find the equation of the tangent line to  $x^2 + xy + y^2 = 3$  at  $(1,1)$ .
4. Find the equation of the line that is tangent to the curve  $y = 5x \cos x$  at the point  $(\pi, -5\pi)$ .
5. Calculate the derivative of  $y$  with respect to  $x$  given that  $x^3 + y^3 + 2y = 6$ .
6. Find the equation of the tangent line to  $y = x^4$  at  $x = 2$ .
7. Suppose that  $F(x) = f(g(x))$  and  $g(3) = 6$ ,  $g'(3) = 4$ ,  $f'(3) = 8$ , and  $f'(6) = 7$ . Find  $F'(3)$ .
8. Use logarithmic differentiation to find the derivative of  $y = x^{\tan x}$ .
9. A rocket is fired vertically upward from the ground. The distance  $s$  in feet that the rocket travels from the ground after  $t$  seconds is given by  $s(t) = -16t^2 + 560t$ .
  - a) Find the velocity of the rocket 3 seconds after being fired.
  - b) Find the acceleration of the rocket 3 seconds after being fired.

**Note:** Since there was no WeBWorK assignment on velocity and acceleration (Section 3.4), the similar problem in Exam 3 will be a 5 point extra credit problem.