

# Math Analysis

## 2021 Summer Assignment

### Teacher: Mr. Joseph Patti

The purpose of this assignment is to review important Pre- Calculus and Algebra II skills that are essential prerequisites for this calculus course. The estimated time of completion should be approximately 3 – 4 hours.

**SHOW ALL WORK FOR FULL CREDIT!!**

Name: \_\_\_\_\_

Due: Friday, September 10, 2021

Complete exercises #1-3 without a calculator. Trigonometric values should be simplified when necessary. (No decimal answers.)

1) Find all six trigonometric values for  $x$  for  $\Delta ABC$ . (6pts)

a)  $\sin x = \underline{\hspace{2cm}}$

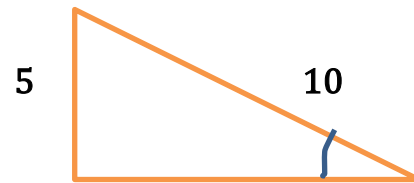
b)  $\cos x = \underline{\hspace{2cm}}$

c)  $\tan x = \underline{\hspace{2cm}}$

d)  $\cot x = \underline{\hspace{2cm}}$

e)  $\sec x = \underline{\hspace{2cm}}$

f)  $\csc x = \underline{\hspace{2cm}}$



2) Give the exact value for each of the following. No decimal answers. (1 pt each)

a)  $\tan \frac{\pi}{4} = \underline{\hspace{2cm}}$

b)  $\sin \left(-\frac{5\pi}{4}\right) = \underline{\hspace{2cm}}$

c)  $\sec \frac{5\pi}{6} = \underline{\hspace{2cm}}$

d)  $\tan \left(-\frac{\pi}{2}\right) = \underline{\hspace{2cm}}$

e)  $\cos \frac{4\pi}{3} = \underline{\hspace{2cm}}$

f)  $\csc \frac{5\pi}{3} = \underline{\hspace{2cm}}$

g)  $\cos \frac{7\pi}{4} = \underline{\hspace{2cm}}$

h)  $\tan \left(-\frac{2\pi}{3}\right) = \underline{\hspace{2cm}}$

i)  $\sin \frac{11\pi}{6} = \underline{\hspace{2cm}}$

j)  $\cos \pi = \underline{\hspace{2cm}}$

k)  $\csc 2\pi = \underline{\hspace{2cm}}$

l)  $\cot \left(-\frac{5\pi}{6}\right) = \underline{\hspace{2cm}}$

3) Point  $P(\sqrt{2}, -\sqrt{2})$  is on the terminal side of angle  $\theta$ . Find all six trigonometric ratios for  $\theta$ . (6 pts)

$$\sin \theta = \underline{\hspace{2cm}} \quad \cos \theta = \underline{\hspace{2cm}} \quad \tan \theta = \underline{\hspace{2cm}}$$

$$\csc \theta = \underline{\hspace{2cm}} \quad \sec \theta = \underline{\hspace{2cm}} \quad \cot \theta = \underline{\hspace{2cm}}$$

4) Fill in the missing term for each trigonometric identity listed below. These are identities that you will need to know for AP Calculus. (1 pt each)

a)  $\underline{\hspace{2cm}} + \sin^2 x = 1$

b)  $\sec^2 x = 1 + \underline{\hspace{2cm}}$

c)  $\underline{\hspace{2cm}} = \frac{\sin^2 x}{\cos^2 x}$

d)  $\cos^2 - \sin^2 x = \underline{\hspace{2cm}}$

e)  $\underline{\hspace{2cm}} = \sin(2x)$

f)  $\underline{\hspace{2cm}} = \frac{1}{\csc(x)}$

g)  $\sin(-x) = \underline{\hspace{2cm}}$

h)  $\cos(-x) = \underline{\hspace{2cm}}$

5) Given the sinusoid  $y = 3 \cos(2x + \frac{\pi}{3})$ , Identify each below. (1 pt each)

a) amplitude =  $\underline{\hspace{2cm}}$

b) period =  $\underline{\hspace{2cm}}$

c) phase shift =  $\underline{\hspace{2cm}}$

d) vertical translation =  $\underline{\hspace{2cm}}$

e) domain =  $\underline{\hspace{2cm}}$

e) range =  $\underline{\hspace{2cm}}$

6) Simplify the expression in terms of  $\sin x$  and  $\cos x$  only. (2 pts)

$$2\cos^2 x - \cos(2x) - \sin^2 x =$$

7) Find all solutions for  $x$  on  $[0, 2\pi)$  for the following trig equations. SHOW ALL WORK! Solutions should be exact—no decimal answers. (3 pts each)

a)  $\cos x = \sin(2x)$

b)  $2\sec^2 x + \tan^2 x - 3 = 0$

c)  $\cos 2x + \cos x = 0$

d)  $\cos^2 x = \sin^2 x$

8) State the domain for each of the following functions. Use interval notation.  
(1 pt each)

a)  $f(x) = \sqrt{1 - x^2}$  Domain = \_\_\_\_\_

b)  $g(x) = \frac{4}{1-3x}$  Domain = \_\_\_\_\_

c)  $y = e^x$  Domain = \_\_\_\_\_

d)  $h(x) = \ln(x + 3)$  Domain = \_\_\_\_\_

9) State the vertical and horizontal asymptotes (show algebraically) for the function. (3 pts)  $y = \frac{x^2}{x^2-9}$

10) Simplify algebraically and show all intermediate steps. (2 pts each)

a)  $\frac{(4n^4)(5n^5)}{(8n^3)(n^6)}$

b)  $\frac{(16y^3)^{\frac{1}{2}}}{(27y)^{\frac{1}{3}}}$

c)  $\left(\frac{4xy^3}{3x^3y}\right)^2$

d)  $\frac{-2s^2(8t^2)(5st)}{6s^3t^2(5st^3)}$

Perform the indicated operations. Show all steps to receive full credit. Reduce answers to simplest terms. (2 pts each)

11)  $\frac{2}{3}x + \frac{3x}{4}$

12)  $\frac{3}{4} - \frac{5}{18} - \frac{1}{9}$

13)  $10a^2 + \frac{2a}{5b}$

14.  $\frac{x^2}{10} \div \left(\frac{2}{x} + \frac{x}{5}\right)$

Solve each equation. Reduce all answers to lowest terms. Show all work! (2 pts each)

15.  $\frac{y}{3} - \frac{y}{9} = 4$

16.  $\frac{x-2}{6} - 2 = \frac{x-1}{9}$

17.  $\frac{x+2}{14} - \frac{4x+1}{7} = 1$

18. Use logarithmic properties to rewrite the expression as one log expression. (2 pts each)

a)  $3\ln 2 + 5\ln x$

b)  $\log(x) - \frac{1}{2}\log(y)$

Write an equation for each and solve algebraically. **SHOW ALL WORK!**  
(5 pts each)

19. Carla deposited \$ 8000 in an account that pays 6.75% annual interest compounded monthly. How long will it take for her money to double in size assuming no other changes occurred to the account.

20. The half-life of a phosphorus-32 is about 14 days. There are 15 grams present initially. When will there be 1 gram left? Round your answer to the thousandth place.

21. Suppose that at the beginning of the day a colony of bacteria starts with one bacterium and doubles in number every  $\frac{1}{2}$  hour. How many bacteria will the colony contain at the end of day?