



1. Solve the system of equations:

a. 
$$\begin{cases} x^2 + y^2 = 9 \\ y = x^2 - 3 \end{cases}$$

b. 
$$\begin{cases} 2x + 3y - z = 13 \\ 5x - y + z = 0 \\ x - 3y - z = -6 \end{cases}$$

2. Simplify the following using partial fraction decomposition

a.  $\frac{2x^3 - 4x^2 - x - 3}{x^2 - 2x - 3}$

b.  $\frac{-2x + 4}{(x^2 + 1)(x + 1)}$

3. Evaluate the following limits:

a.  $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - x}$

b.  $\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 100} - 10}{x^2}$

c.  $\lim_{x \rightarrow 0} \sqrt{7 + \sec^2 x}$

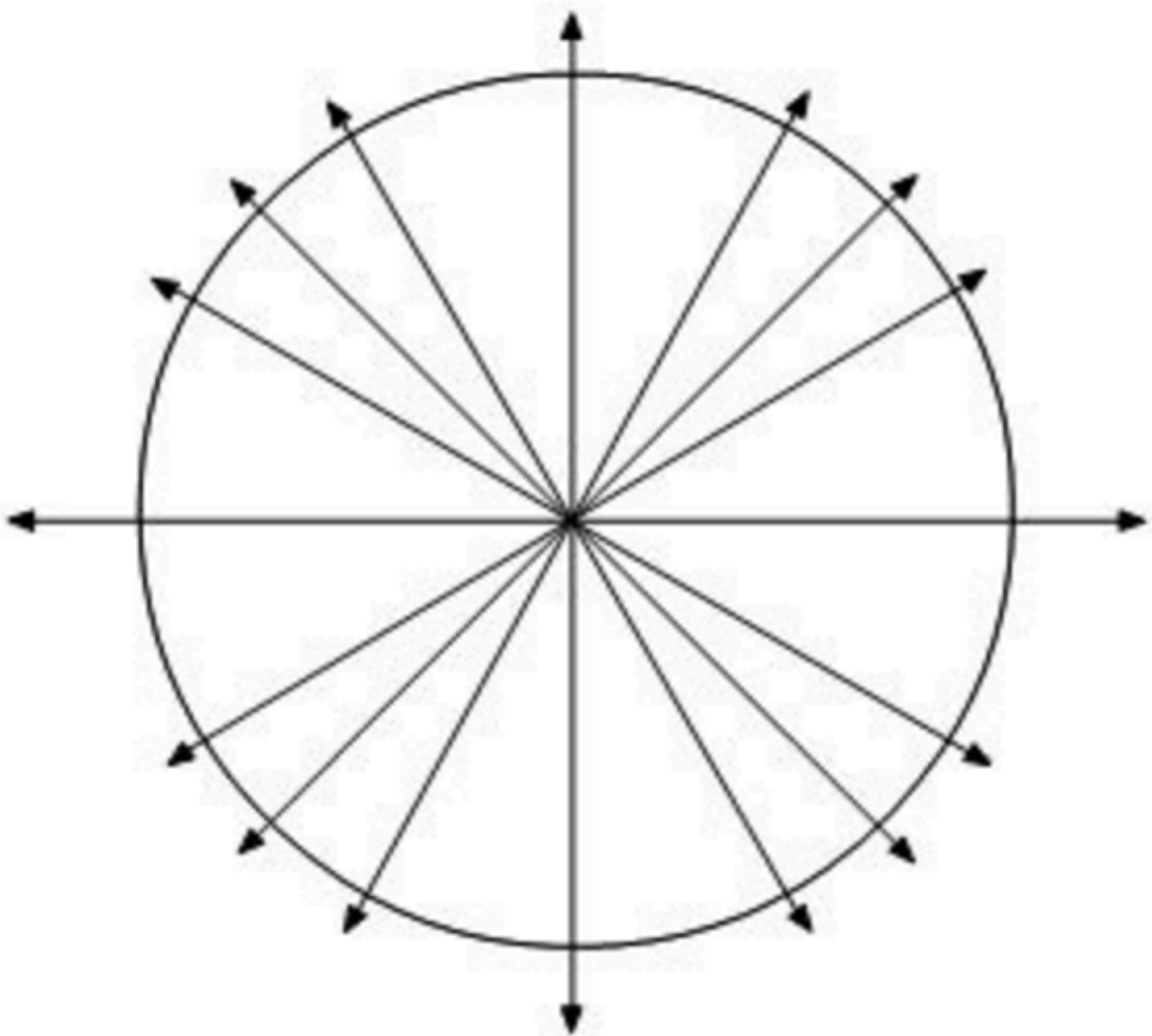
4. Consider  $f(x) = \frac{1}{x}$

a. Find a formula for the average rate of change of  $f(x)$

b. Take the limit of your result in part (a), as  $h$  goes to 0, to find the instantaneous rate of change for  $f(x)$ .

c. Evaluate your answer in part (b) at  $x = -2$

5. Below is the unit circle. For all angles shown (as well as the *x-axis* and the *y-axis*, label the following:
- The angle measurements in degrees
  - The angle measurements in radians
  - The coordinates of the points on the circle.



6. Graph the following. Be sure to identify asymptotes and at least one identifying point. For trigonometric functions, graph at least 2 periods.

a.  $y = e^{x-2} + 3$

b.  $y = -4 \sin(3x + \pi)$

c.  $y = \ln(-x - 2)$

d.  $y = 1 - \sec(2x)$

7. Solve the following trigonometric equations. If there are no solutions you must show all work proving this fact.

a.  $\sqrt{3}\sec x - 1 = 1$  for all possible solutions

b.  $1 - \sin^2 x - \cos x = 6$  for all possible solutions

c.  $\cos\theta\sin\theta = \cos\theta$  for solutions in  $[0, 2\pi)$



8. Evaluate:

a.  $\sec^{-1}(\sqrt{2})$

b.  $\csc\left(\arctan\left(-\frac{\sqrt{3}}{3}\right)\right)$

c.  $\tan(\sin^{-1}(1))$

9. Verify the following identity:  $\frac{\sec\theta}{\tan\theta} = \frac{\tan\theta}{\sec\theta - \cos\theta}$

10. Given that  $\tan\theta = -\frac{1}{4}$  and  $\sin\theta > 0$ ,

a. Find  $\sin 2\theta$

b. Find  $\cos 2\theta$

11. Solve the following:

a.  $\log x = 2 + \log(x - 1)$

b.  $8^{3x-2} = 9^{x+2}$

