

1. True or false.

(a) $\frac{\ln 8}{\ln 2} = 4$

(b) $\cos\left(\frac{\pi}{3}\right) = \cos\left(\frac{5\pi}{3}\right)$

(c) $(\log_9 3)(\log_5 \frac{1}{25}) = -1$

(d) $f(\theta) = \cos \theta$ is an even function.

2. Find all solutions to the following system of equations.

$$\begin{aligned}\frac{1}{x} - \frac{1}{y} &= 2 \\ 4x + y &= 3\end{aligned}$$

3. Radon-222 has a half-life of 92 hours. About how many hours will it take for a sample of radon-222 to have only one-eighth as much radon-222 as the original sample?

4. Find all numbers x such that $\frac{\ln(11x)}{\ln(4x)} = 2$.

5. For a 16-inch pizza (a diameter of 16), find the area of a slice with angle $\frac{2}{3}$ radians.

6. Suppose a colony of 100 cells of the neon pink colored Magenta bacteria quadruples in size every two hours.

(a) Find a function that models the population growth of the colony of bacteria.

(b) Approximately how many cells will be in the colony after five hours.

7. About how many years does it take for \$300 to become \$2,400 when compounded continuously at 5% per year?

8. Find all numbers x that satisfy $\log_3(x + 5) + \log_3(x - 1) = 2$.

9. Suppose a 19-foot ladder is leaning against a wall, making a 60° angle with the ground. How high up the wall is the end of the ladder?

10. The 2010 Haiti earthquake was measured at a Richter magnitude of 7.0. How many times more intense was this earthquake compared to the 2010 Eureka earthquake measured at a Richter magnitude 6.5?

11. Suppose y is a number such that $\tan y = -\frac{2}{9}$. Evaluate $\tan(-y)$.

12. Show that

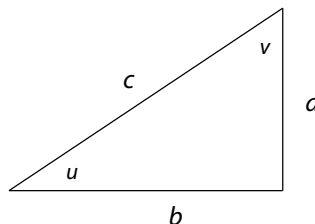
$$\sin^2 \theta = \frac{\tan^2 \theta}{1 + \tan^2 \theta}$$

for all θ except odd multiples of $\frac{\pi}{2}$.

13. Use the figure to the right to solve the following:

Suppose $a = 5$ and $b = 8$. Evaluate

- (a) $\sin u$
- (b) $\cot u$
- (c) $\sec v$



14. Find the smallest number x such that $\tan e^x = 0$.

15. Suppose $-\frac{\pi}{2} < x < 0$ and $\cos x = \frac{5}{9}$. Evaluate $\sin x$ and $\tan x$.

16. Suppose an ant walks counterclockwise on the unit circle from the point $(0, 1)$ to the endpoint of the radius that forms an angle of $\frac{5\pi}{4}$ radians with the positive horizontal axis. How far has the ant walked?

17. Let $f(x) = 5 + 6e^{7x}$.

- (a) Find the domain of f .
- (b) Find the range of f .
- (c) Find a formula for f^{-1} .
- (d) Find the domain of f^{-1} .
- (e) Find the range of f^{-1} .

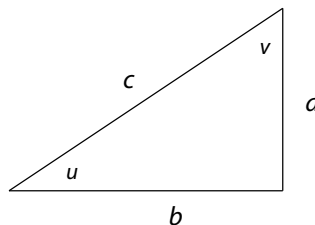
18. Suppose $\log_7 w = 3.1$ and $\log_7 z = 2.2$. Evaluate $\log_7 \frac{49w^2}{z^3}$.

19. Find all numbers x such that $e^{4x} - 9e^{2x} - 22 = 0$.

20. Create a table showing the endpoints of the radius of the unit circle corresponding to the angles $\frac{3\pi}{2}$, $\frac{5\pi}{3}$, $\frac{7\pi}{4}$, and $\frac{11\pi}{6}$.

21. Use the figure to the right to solve the following:

Suppose $\cos u = \frac{2}{3}$. Evaluate $\cos v$.



22. Find a formula for the inverse of the function f defined by $f(x) = 4 + 5 \log_3(7x + 2)$.