

Name: _____

Worksheet 2 - exponential, logarithmic, and trigonometric functions

If you had trouble with question 2a, 2b, or 2c, do these problems.

1. Compute the following: $\log_2(8)$, $\log_2(4)$, $\log_2(2)$, $\log_2(1)$, $\log_2(1/2)$ and $\log_2(1/4)$.
2. Sketch the graphs of the following functions, indicating where they cross the axes.
 - (a) $f(x) = e^x$
 - (b) $f(x) = e^{-x}$
 - (c) $f(x) = \log_2 x$
 - (d) $f(x) = \ln x$
3. Name a real world phenomenon that can be modeled using $f(x) = e^{-x}$.
4. Simplify $\ln((e^2)(e^3))$ and $2 \ln(x) - \ln(x^3)$.
5. Solve for x in terms of y if $2 \log(x) = 6 + 3 \log y$.
6. Sketch the following functions, indicating where they cross the axes.
 - (a) $f(x) = \cos x$
 - (b) $f(x) = \sin x$
 - (c) $f(x) = \tan x$
 - (d) $f(x) = \sec x$

7. Compute $\sin(0)$, $\sin(\pi/2)$, $\sin(\pi)$, $\cos(0)$, $\cos(\pi/2)$, $\cos(\pi)$, and $\tan(0)$.

8. Draw half of an equilateral triangle (with angles $\pi/3$, $\pi/6$ and $\pi/2$).
Compute $\cos(\pi/3)$, $\sin(\pi/3)$, $\tan(\pi/3)$, $\cos(\pi/6)$, $\sin(\pi/6)$, and $\tan(\pi/6)$.

9. Draw an isosceles right triangle (with angles $\pi/2$, $\pi/4$, and $\pi/4$).
Compute $\sin(\pi/4)$, $\cos(\pi/4)$ and $\tan(\pi/4)$.

10. Cool fact: a point (x, y) on the unit circle $x^2 + y^2 = 1$ has values $(x, y) = (\cos \theta, \sin \theta)$, where θ is the angle measured counterclockwise from the positive x -axis to the ray from $(0, 0)$ to (x, y) .
Compute $\cos(4\pi/3)$, $\cos(5\pi/3)$, $\sin(-3\pi/2)$, $\sin(-3\pi/4)$, $\tan(\pi/4)$, and $\tan(5\pi/4)$.

11. Use the trig identity $\sin^2 x + \cos^2 x = 1$ to derive the identity $\tan^2 x + 1 = \sec^2 x$.

12. Use the trig identity $\sin(a + b) = \sin(a) \cos(b) + \sin(b) \cos(a)$ to derive the identity $\sin(2a) = 2 \sin a \cos a$.

13. Use the trig identity $\cos(a + b) = \cos(a) \cos(b) - \sin(a) \sin(b)$ to derive the identities $\cos(2a) = 2 \cos^2 a - 1 = 1 - 2 \sin^2 a$.

14. Name a real world phenomenon that can be modeled using $f(x) = e^{-x} \sin(x)$.