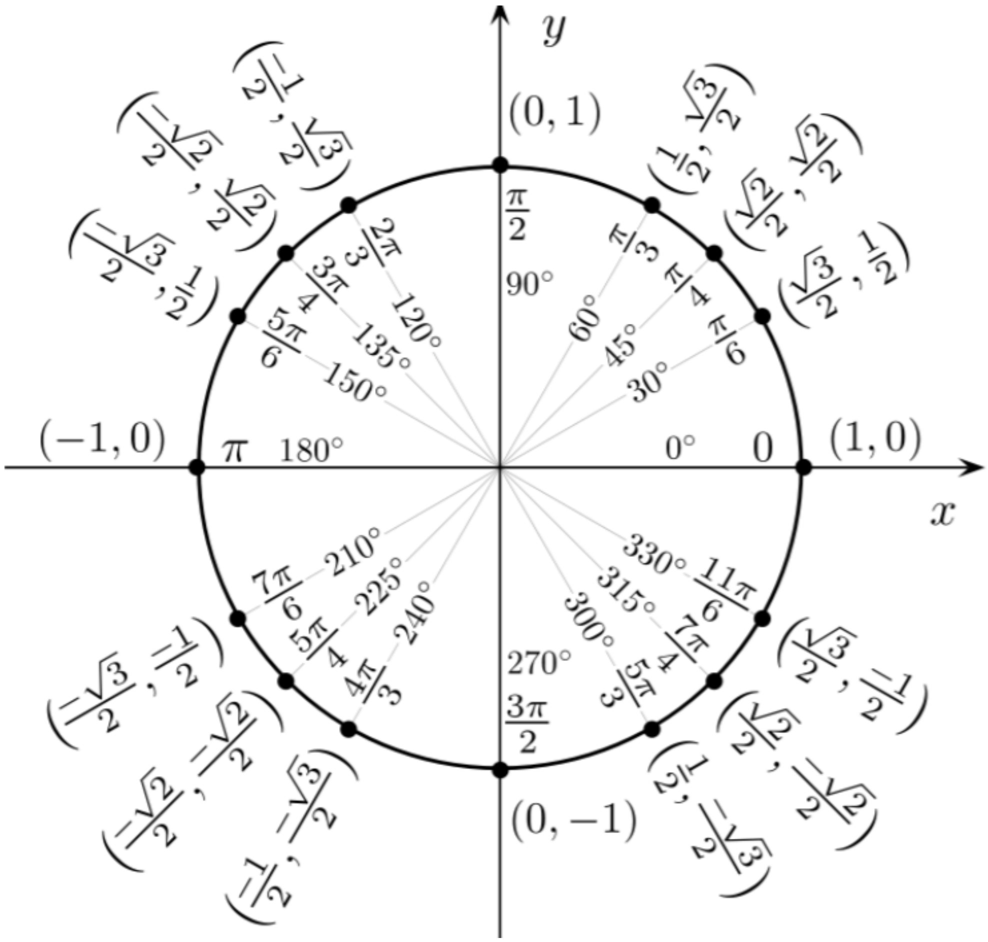
You can rip this page off if needed and use for the rest of the exam.



Pythagorean Trig Identities

1. $\sin^2(x) + \cos^2(x) = 1$
2. $1 + \cot^2(x) = \csc^2(x)$
3. $\tan^2(x) + 1 = \sec^2(x)$

Sum and Difference Formulas

1. $\sin(u+v) = \sin(u)\cos(v) + \cos(u)\sin(v)$
2. $\sin(u-v) = \sin(u)\cos(v) - \cos(u)\sin(v)$
3. $\cos(u+v) = \cos(u)\cos(v) - \sin(u)\sin(v)$
4. $\cos(u-v) = \cos(u)\cos(v) + \sin(u)\sin(v)$
5. $\tan(u+v) = \dfrac{\tan(u) + \tan(v)}{1 - \tan(u)\tan(v)}$
6. $\tan(u-v) = \dfrac{\tan(u) - \tan(v)}{1 + \tan(u)\tan(v)}$

Law of Sines

1. $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Law of Cosines

1. $a^2 = b^2 + c^2 - 2bc\cos(A)$
2. $b^2 = a^2 + c^2 - 2ac\cos(B)$
3. $c^2 = a^2 + b^2 - 2ab\cos(C)$

1. Simplify each expression.

   a) $(3x)^{-2}(3xz^0)^3$

   b) $\left(\frac{3}{x}\right)^2\left(\frac{2}{y}\right)^{-2}$

2. Find the domain of the given function.

   $f(x) = \frac{13}{\sqrt{2-x}}$

   $g(x) = x^2 + 15x - 29$

3. Write an equation of the line that has the given characteristics.

   a) Passes through points $(3, 2)$ and $(-6, 8)$

b) Passes through points $(3, -1)$ and $(-2, -1)$

c) Perpendicular to $y = -\frac{3}{5}x + 1$ and passes through the point $(-3, 4)$

4. Use these functions for the following questions:

$$f(x) = 3x + 2$$

$$g(x) = x^2 - 5x + 12$$

a) Find the function $f \circ f$

b) Find the function $g \circ f$

5. Find the inverse function of f.

$$f(x) = \sqrt[3]{-4x + 15}$$

6. Find all solutions.

a) $3x^2 - 7x - 6 = 0$

b) $x^3 - 9x^2 + 14x = 0$

7. Find the solution. Round to two decimal places. (Solve for the variable first, *then* grab a calculator)

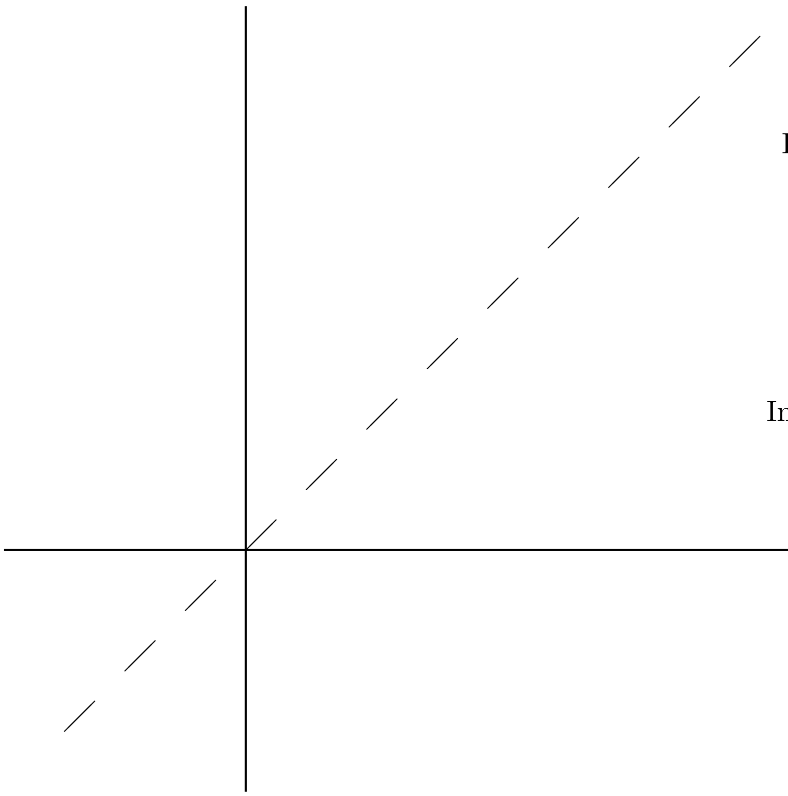
a) $e^{7x} = 86$

b) $4^{2x} = 134$

c) $5(e^{3x+1} - 8) = 400$

d) $\log_7(x) + \log_7(x + 2) = \log_7(8)$

8. Graph the functions, $y = a^x$ and $y = \log_a x$ on the same graph. Label any intercepts and give the domain and range of both. (If intercepts don't exist, write DNE)



Details about each graph

	$y = a^x$	$y = \log_a x$
Domain:		
Range:		
Intercepts:		

9. Condense the following logarithm.

$$3\log_4(x) - 2\log_4(y) + \log_4(z)$$

10. Modeling

a) The number N of bacteria in a culture follows the exponential growth model $N = Ae^{kt}$, where t is the time in hours. If the initial population, A, is 90 and 6 hours later $N = 250$, when will $N = 1800$? Round your final answer to two decimal places.

b) The population p of a species of bird t years after it is introduced into a new habitat is given by:

$$p = \frac{3000}{1 + 5e^{-t/3}}$$

1) Determine the population size that was introduced into the habitat.

2) After how many years will the population be 2000? Round your final answer to two decimal places.

11. Evaluate the following expressions in exact form.

a) $\sin \frac{3\pi}{2} =$

b) $\tan \frac{3\pi}{4} =$

c) $\cos^{-1}(-\frac{\sqrt{3}}{2}) =$

d) $\tan^{-1}(\sqrt{3}) =$

12. Solve for all possible triangles: $A = 34^\circ$, $B = 102^\circ$, $c = 18$ Round all answers to two decimal places

13. Rewrite as an algebraic expression of x.

$$\cos(\sin^{-1}(x))$$

14. Find all solutions.

a) $2\sin(4x) - 1 = 0$

b) $2\sin(x)\cos(x) - \cos(x) = 0$

15. Points P and Q are separated by a lake. To find the distance between them, a surveyor locates point R on land such that angle R is 110°, the distance from P to R is 300 feet, and the distance from Q to R is 175 feet. Draw a picture to represent the problem and find the distance between points P and Q. Round your answer to the nearest foot.

16. A pilot measures the angle of depression to two ships in the water in front of the plane as 15° and 25° respectively. The pilot is flying at an altitude of $20,000$ feet. Draw a picture representing the problem and find the distance between the two ships. Round your answer to the nearest foot.

17. Match the equation to the graph.

i) $y = \cos(3x) + 1$

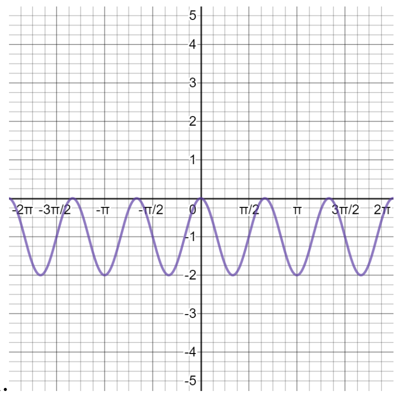
ii) $y = 2\sin(x)$

iii) $y = 4\cos(2x)$

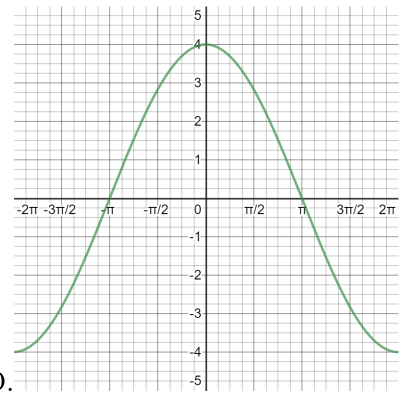
iv) $y = 4\cos(\frac{1}{2}x)$

v) $y = \cos(3x) - 1$

vi) $y = 2\sin(-x)$



A.



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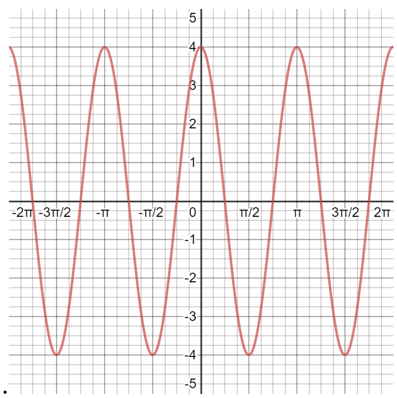

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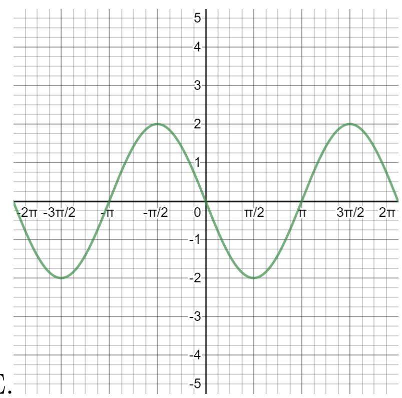

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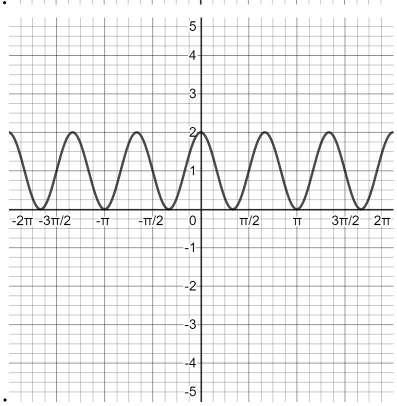

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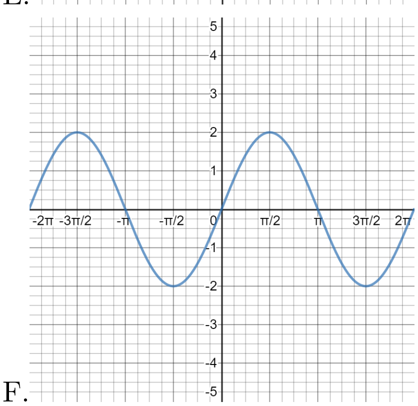

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