Precalculus CP 1 - Midyear Review Questions for Chapters 1, 4, 5, 6

The following are GREAT problems to do when studying for your final exam. We will have some time in class for you to work on them, but you should also spend some time on your own to be sure you understand each one. If you need more practice, try redoing your ICEs and old tests and quizzes.

1) A straight road is going slightly uphill. The road is 10,000 ft. long, and rises a total of 650 ft.

   a) Draw a picture representing the situation using a right triangle. Label the road length and the rise of theroad. Call the unknown horizontal distance x.
   Call the angle of elevation θ.

   b) Use the Pythagorean Theorem to find the horizontal distance.
   Give your answer in feet rounded to 2 decimal places.

   c) Find the angle of elevation. Use degrees and round to 2 decimal places.

   d) If a car goes up the entire hill in 6 minutes, what is the speed of the car in miles per hour?
   (there are 5280 ft. in 1 mile) (round to 2 decimal places)

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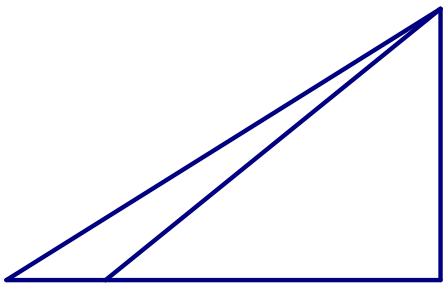
2) From take-off, an airplane travels 400 miles at an angle of 25° north of east. Find the distance that the plane traveled a) north and b) east.

For #3-4, sketch the angle in standard position. Find the degree measure equivalent. Then find two coterminal angles- one positive and one negative.

3) $\frac{-5\pi}{3}$

4) $\frac{17\pi}{6}$

5) From a certain distance, the angle of elevation to the top of a building is 39°. At a point 10 meters farther from the building, the angle of elevation is 32°. Approximate the height of the building to three decimals, and find the original distance you were from the building before you moved farther away.



6) For the following triangles, use the law of sines and cosines to solve for all the missing sides and angles. Then find the area of each triangle. Be sure to check to see if you have two triangles in certain cases!

a) $\angle A = 19°, \angle B = 89°, b = 9.4$

b) $\angle A = 48°, a = 12, b = 10$

c) $\angle C = 123°, a = 16, b = 5$

6d) $a = 4, b = 5, c = 7$

Use ANY OF THE FORMULAS (sum, difference, half, double) for the following questions:

7) Find the **EXACT value** of the expression – this means no decimals!

a) $\sin(-75°)$

b) $\tan 22.5°$

8) Write the expression as the sine, cosine, or tangent of the angle; you do not have to find the value:

a) $\sin 60° \cos 45° - \cos 60° \sin 45°$

b) $\dfrac{\tan 25° + \tan 10°}{1 - \tan 25° \tan 10°}$

c) $12 - 24\sin^2 x$

d) $\sqrt{\dfrac{1 - \cos 6x}{2}}$

9) Find the **exact value** of the trig function given that
$\sin u = \frac{3}{5}$ and $\cos v = \frac{-7}{25}$, where both u and v are in the same quadrant.

$\sin(u - v) =$ $\tan(u + v) =$

$\cos 2u =$ $\tan \frac{v}{2} =$

Do the following problems WITHOUT a calculator!

10) Find the exact value of angle θ in [0,2π]

$$\cos\theta = -\frac{\sqrt{3}}{2}$$

11) Evaluate sin θ, if $\tan\theta = \frac{2}{5}$ and $\cos\theta < 0$.

12) Find the five remaining trig functions of θ satisfying the condition:

$\sin\theta = \frac{-3}{7}$, $\cos\theta > 0$

13) Use the given function value and trig identity to find the indicated trig functions:
$\csc\theta = 5$

a) $\sin\theta =$ b) $\cos\theta =$ c) $\sec\theta =$ d) $\tan\theta =$

14) Show why the following are true

A) $\sin\theta\csc\theta = 1$

B) $\cos\theta\csc\theta = \cot\theta$

15) Find the EXACT values of the six trig functions of the angle θ (in standard position) whose terminal side passes through the point $(3,-4)$

$\sin\theta =$ $\cos\theta =$

$\tan\theta =$ $\cot\theta =$

$\sec\theta =$ $\csc\theta =$

16) Solve the following Trig Equations to find the ANGLE(S) in domain $[0,2\pi)$:

a) $3\sec^2 x - 4 = 0$

b) $\sin 2x + \cos x = 0$

c) $2\cos^2 x - \cos x - 1 = 0$

17) Evaluate the following (it may help to draw a picture – look for special right triangles).Find two angles as your answers.

a) $\sin\theta = -\frac{1}{2}$

degrees: _____

_____

b) $\cos\theta = \frac{\sqrt{2}}{2}$

degrees: _____

_____

18) PROVE the trigonometric identities- be sure to only use ONE side!

a) $\sin^2\beta - \cos^2\beta = 2\sin^2\beta - 1$

b) $\dfrac{\sin\alpha}{\cos\alpha} + \dfrac{\cos\alpha}{\sin\alpha} = \csc\alpha\sec\alpha$

c) $\dfrac{\sin\left(\dfrac{\pi}{2} - x\right)}{\sin x} \cdot \tan x = 1$

19) Find the amplitude and period of the following equations:

a) $y = -6\sin\frac{x}{2}$

amp = _____

period = _____

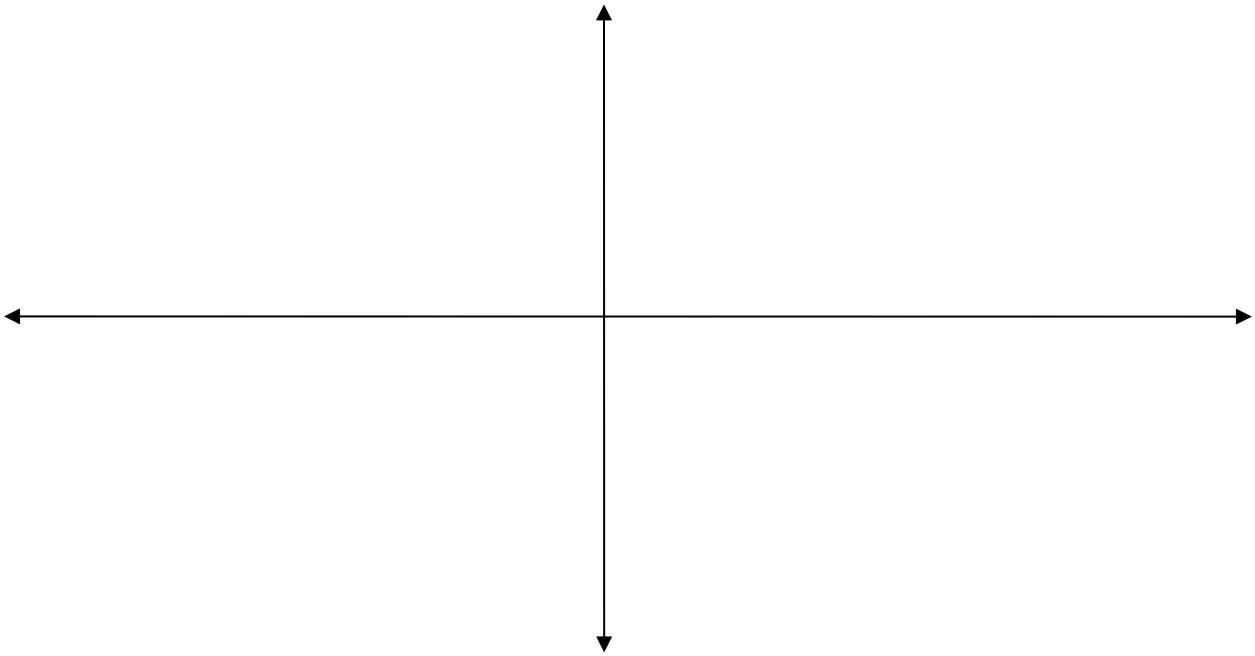
b) $y = \frac{1}{7}\cos 4\left(x + \frac{\pi}{2}\right)$

amp = _____

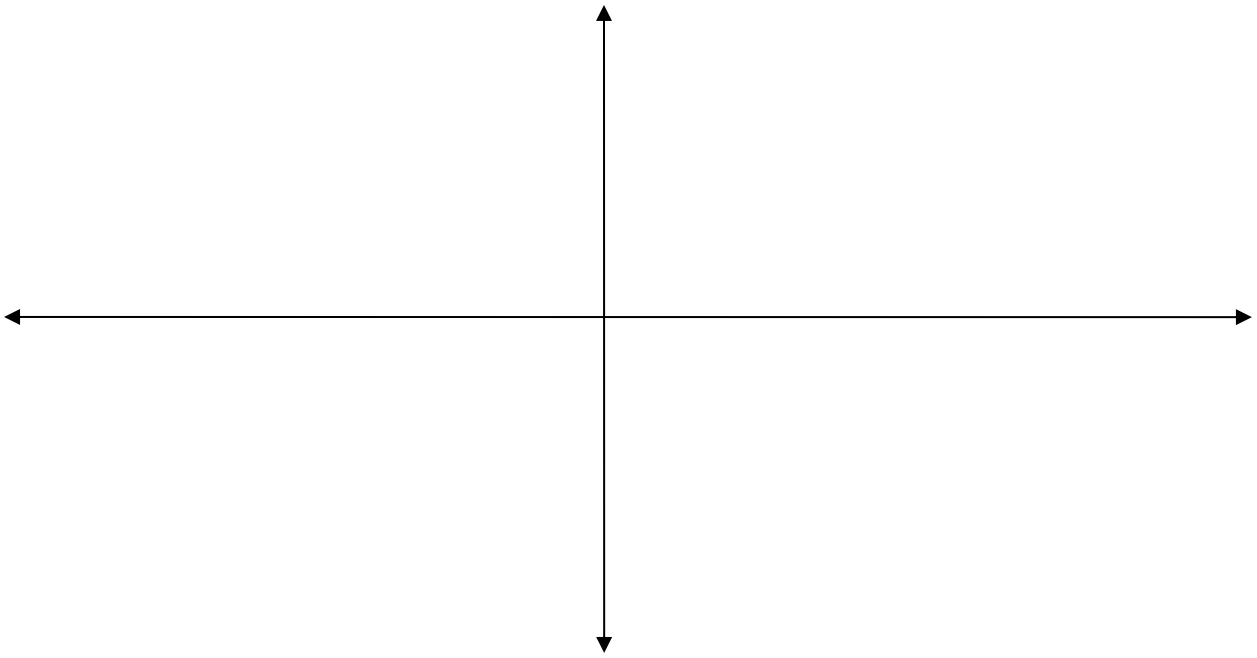
period = _____

20) Graph the following functions from -2π to 2π.

a) $y = -\sin\left(x - \frac{\pi}{4}\right) + 1$

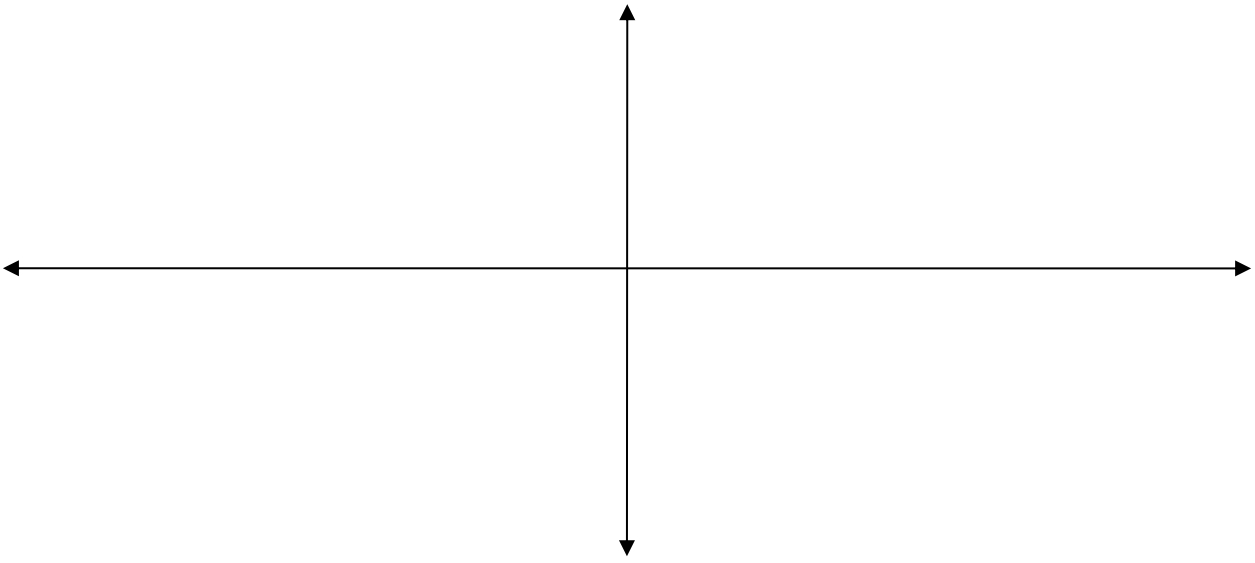


b) $y = 3\sin\frac{1}{2}x$

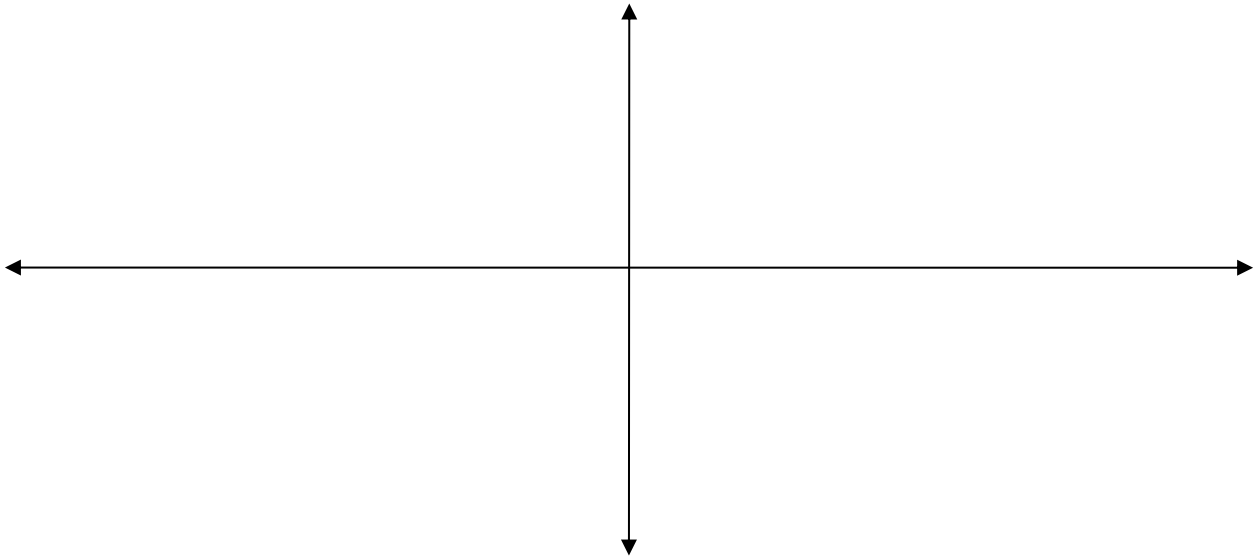


21) Graph the following functions from $-\pi$ to π.

a) $y = \cot(2x) + 2$



b) $y = -\frac{1}{2}\tan\left(x - \frac{\pi}{2}\right)$



The following is review from chapter 1- this will not be a big part of the midyear exam, but there will be a few questions (multiple choice only), so it is worth it to review this stuff again!

22) Find the standard form of the equation of the circle described:
center at (-7, 5) & r = 9

23) In what Quadrant is (x,y) located if $y > 0$ and $x < -4$?

24) $f(x)=7x^2-1$

a) What type of symmetry does $f(x)$ have?

b) Is $f(x)$ even, odd, or neither?

25) $f(x)=\dfrac{5}{\sqrt{x-4}}$

a) What is the domain of $f(x)$?

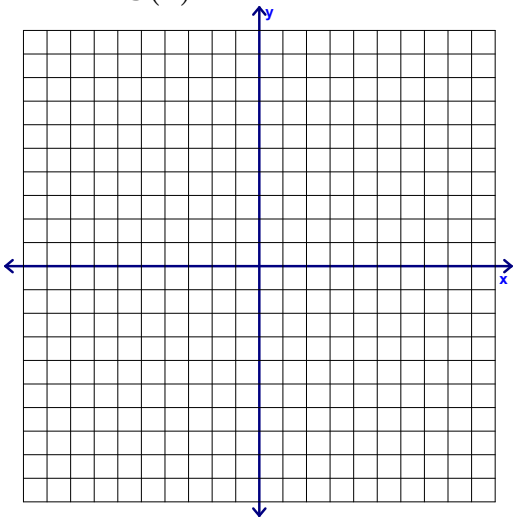
b) Find $f^{-1}(x)$

c) What is the domain of $f^{-1}(x)$?

26) If $f(x)=-3(x+2)^2-1$

a) What is $f(4)$?

b) Describe the transformation compared to the parent function $g(x)=x^2$ and sketch a graph.



c) What are the domain and range of $f(x)$?