Precalculus
4.2-4.6 Test Review

Name Key
Period_____ Date_____

Convert to radian measure.

1. $-16°$ $-16°\left(\pi/180°\right) = -\frac{4\pi}{45}$	2. $112°$ $112°\left(\pi/180°\right) = \frac{28\pi}{45}$

Convert to degree measure.

3. $\frac{3\pi}{10}$ $\frac{3\pi}{10}\left(\frac{180°}{\pi}\right) = 54°$	4. $-\frac{11\pi}{6} = -330°$

Find the point on the unit circle that corresponds to θ.

5. $\theta = \frac{2\pi}{3}$ $\left(-1/2, \sqrt{3}/2\right)$	6. $\theta = \frac{7\pi}{4}$ $\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$
7. $\theta = \frac{7\pi}{6}$ $\left(-\sqrt{3}/2, -1/2\right)$	8. $\theta = -\frac{4\pi}{3}$ $\left(-1/2, \sqrt{3}/2\right)$

Evaluate the six trigonometric functions, given θ .

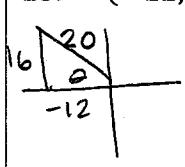
9. $\theta = \frac{3\pi}{4}$ $\left(-\sqrt{2}/2, \sqrt{2}/2\right)$ $\sin\theta = \sqrt{2}/2$ $\csc\theta = \frac{2}{\sqrt{2}} = \sqrt{2}$ $\cos\theta = -\sqrt{2}/2$ $\sec\theta = -\sqrt{2}$ $\tan\theta = -1$ $\cot\theta = -1$	10. $\theta = -\frac{2\pi}{3}$ $\left(-1/2, -\sqrt{3}/2\right)$ $\sin\theta = -\sqrt{3}/2$ $\csc\theta = \frac{-2}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$ $\cos\theta = -1/2$ $\sec\theta = -2$ $\tan\theta = \sqrt{3}$ $\cot\theta = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

Use a calculator to evaluate the trigonometric function. Round your answer to four decimal places.

11. $\sec\frac{12\pi}{5}$ 3.2360	12. $\sin 324°$ $-.5878$
13. $\cot 33°$ 1.5399	14. $\csc 10.5$ -1.1368

The point is on the terminal side of an angle in standard position. Find the exact values of the six trigonometric functions of the angle.

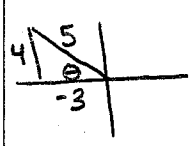
15. $(-12, 16)$



$(-12)^2 + 16^2 = h^2$

$h = 20$

reduces



$\sin\theta = \frac{4}{5}$ $\csc\theta = \frac{5}{4}$

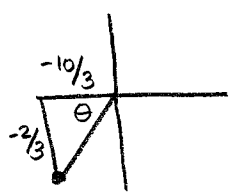
$\cos\theta = \frac{-3}{5}$ $\sec\theta = \frac{-5}{3}$

$\tan\theta = -\frac{4}{3}$ $\cot\theta = \frac{-3}{4}$

16. $\left(-\frac{10}{3}, -\frac{2}{3}\right)$

$(-10/3)^2 + (-2/3)^2 = h^2$

$h = \sqrt{\frac{104}{9}} = \frac{2\sqrt{26}}{3}$



$\sin\theta = \frac{\frac{-2}{3}}{\frac{2\sqrt{26}}{3}} = \frac{-2}{3}\cdot\frac{3}{2\sqrt{26}} = \frac{-1}{\sqrt{26}} = \frac{-\sqrt{26}}{26}$ $\csc\theta = -\sqrt{26}$

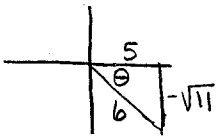
$\cos\theta = \frac{\frac{-10}{3}}{\frac{2\sqrt{26}}{3}} = \frac{-10}{3}\cdot\frac{3}{2\sqrt{26}} = \frac{-5}{\sqrt{26}} = \frac{-5\sqrt{26}}{26}$ $\sec\theta = \frac{-\sqrt{26}}{5}$

$\tan\theta = \frac{-2/3}{-10/3} = -2/3 \cdot -3/10 = 1/5$ $\cot\theta = 5$

Find the exact values of the remaining five trigonometric functions of θ satisfying the given conditions.

17. $\sec\theta = \frac{6}{5}$, $\tan\theta < 0$ Quad IV

1 & 4 2 & 4



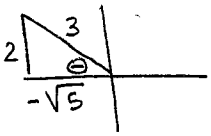
$\sin\theta = -\frac{\sqrt{11}}{6}$ $\csc\theta = \frac{-6\sqrt{11}}{11}$

$\cos\theta = \frac{5}{6}$ $\sec\theta = \frac{6}{5}$

$\tan\theta = \frac{-\sqrt{11}}{5}$ $\cot\theta = \frac{-5\sqrt{11}}{11}$

18. $\csc\theta = \frac{3}{2}$, $\cos\theta < 0$ Quad 2

1 & 2 2 & 3



$\sin\theta = \frac{2}{3}$ $\csc\theta = \frac{3}{2}$

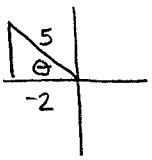
$\cos\theta = \frac{\sqrt{5}}{3}$ $\sec\theta = \frac{3\sqrt{5}}{5}$

$\tan\theta = \frac{2}{-\sqrt{5}} = \frac{-2\sqrt{5}}{5}$ $\cot\theta = \frac{-\sqrt{5}}{2}$

19. $\cos\theta = -\frac{2}{5}$, $\sin\theta > 0$ Quad 2

2 & 3 1 & 2

$\sqrt{21}$



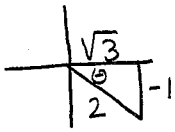
$\sin\theta = \frac{\sqrt{21}}{5}$ $\csc\theta = \frac{5}{\sqrt{21}}$

$\cos\theta = \frac{-2}{5}$ $\sec\theta = \frac{-5}{2}$

$\tan\theta = \frac{-\sqrt{21}}{2}$ $\cot\theta = \frac{-2\sqrt{21}}{21}$

20. $\sin\theta = -\frac{1}{2}$, $\cos\theta > 0$ Quad 4

3 & 4 1 & 4



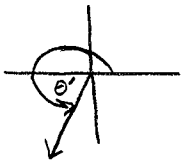
$\sin\theta = -\frac{1}{2}$ $\csc\theta = -2$

$\cos\theta = \sqrt{3}/2$ $\sec\theta = \frac{2\sqrt{3}}{3}$

$\tan\theta = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$ $\cot\theta = -\sqrt{3}$

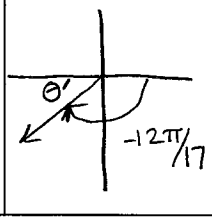
Find the reference angle θ'. Sketch θ in standard position and label θ'.

21. $\theta = 264°$



$\theta' = 84°$

22. $\theta = -\frac{12\pi}{17}$



$\theta' = \frac{5\pi}{17}$

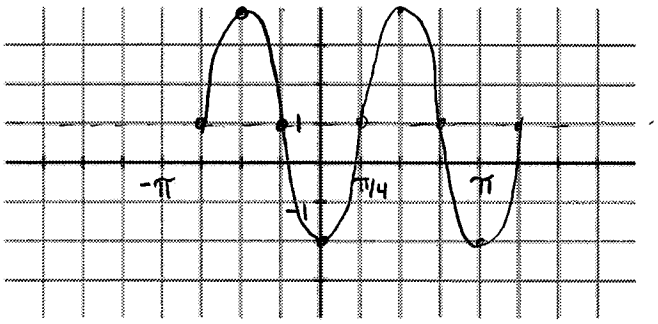
Graph the following showing two periods. (Make sure to scale your graph clearly):

23. $y = 1 + 3\sin\left(2x - \frac{\pi}{2}\right)$

Amp = 3

Period: $\frac{2\pi}{2} = \pi$ count $\pi/4$

right $\pi/4$



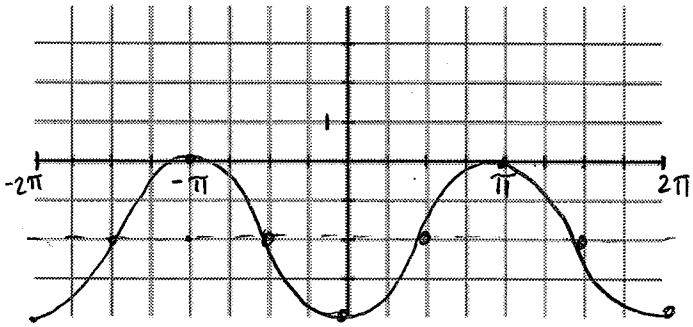
24. $y = 2\cos(x + \pi) - 2$

Amp = 2

Period: 2π

count $\pi/2$

Left π down 2



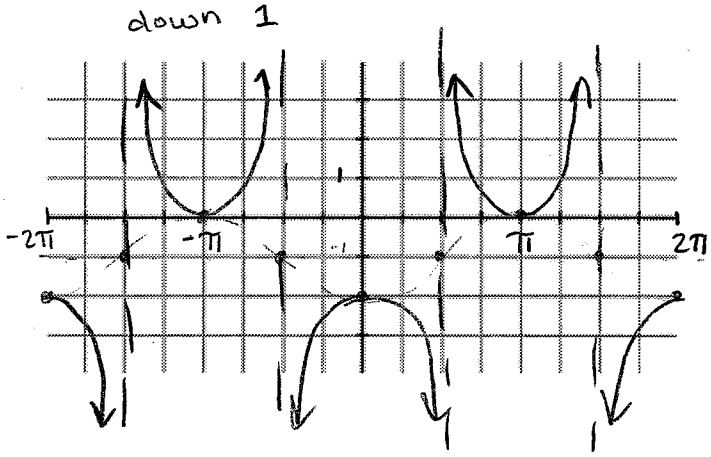
25. $y = \csc\left(x - \frac{\pi}{2}\right) - 1$ sin

amp 1

P: 2π count $\pi/2$

Right $\pi/2$

down 1



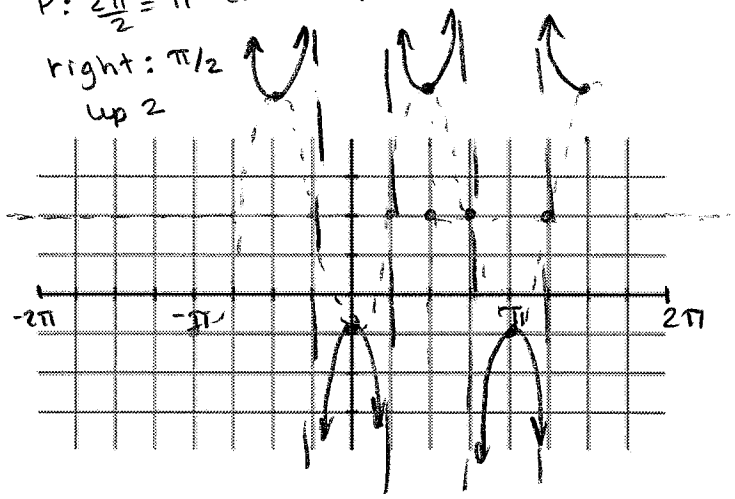
26. $y = 3\sec(2x - \pi) + 2$ cos

amp: 3

P: $\frac{2\pi}{2} = \pi$ count $\pi/4$

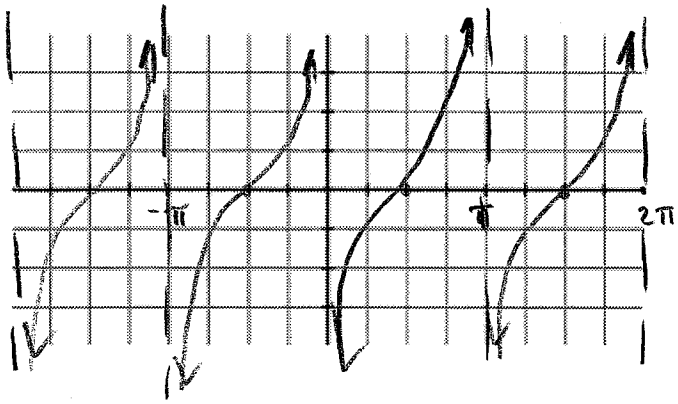
right: $\pi/2$

up 2



27. $y = -4\cot x$

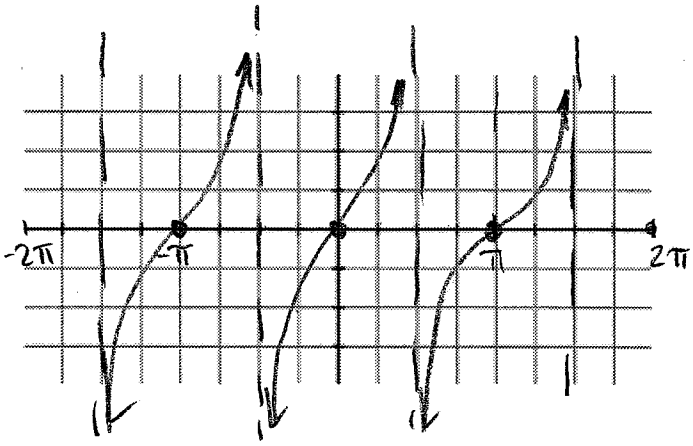
P= π



28. $y = \tan\left(x + \frac{\pi}{2}\right)$

P = π

left π/2

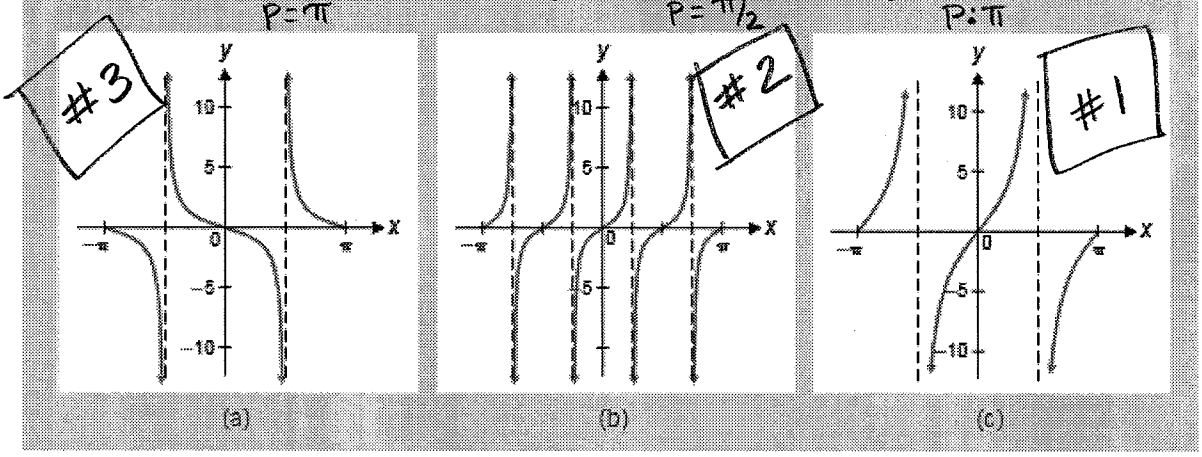


29. (A) Match each function to its graph and discuss how the graph compares to the graph of $y = \tan x$ or $y = \cot x$.

(1) $y = 4\tan x$ P= π

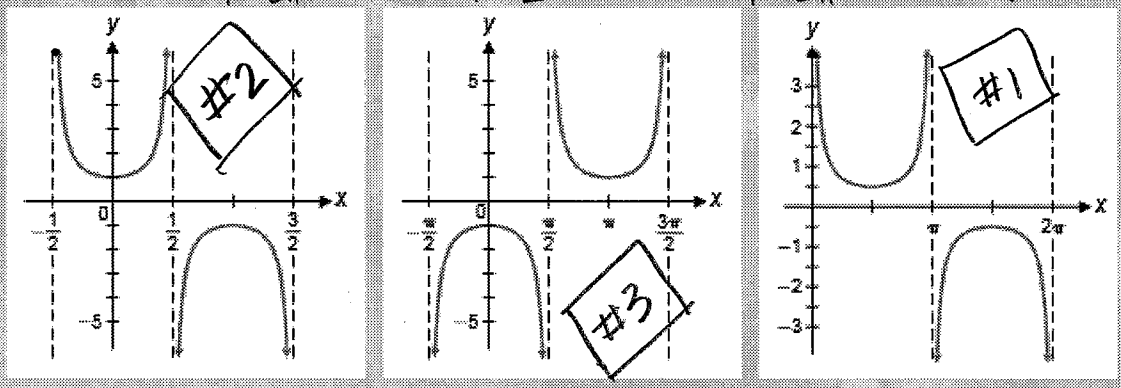
(2) $y = \tan 2x$ P= π/2

(3) $y = \cot(x - \pi/2)$ P: π



30. (A) Match each function to its graph, and discuss how the graph compares to the graph of $y = \csc x$ or $y = \sec x$.

Amp: $\frac{1}{2}$ (1) $y = \frac{1}{2}\csc x$ P= 2π (2) $y = \sec \pi x$ P= 2 (3) $y = \csc(x - \pi/2)$ P= 2π Amp: 1



(a) (b) (c)

Tell whether the function exhibits damped oscillation. If so, identify the damping factor and tell whether the damping occurs as $x \to 0$ or as $x \to \infty$. use graphing calculator

31. $f(x) = e^{-x}\sin 3x$

damping factor e^{-x}

$x \to \infty$

32. $f(x) = x\sin 4x$

damping factor x

$x \to 0$

33. $f(x) = \sqrt{5}\cos 1.2x$

No damping

34. $f(x) = \pi^2 \cos \pi x$

no damping

35. $f(x) = x^3 \sin 5x$

damping factor x^3

$x \to 0$

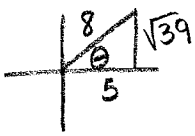
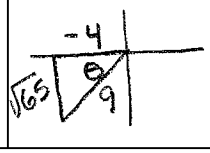
36. $f(x) = \left(\frac{2}{3}\right)^2 \sin\left(\frac{2x}{3}\right)$

no damping

Find 2 solutions of each equation. Give your answers in degrees ($0° \le \theta < 360°$) and radians ($0 \le \theta < 2\pi$)

37. $\sin\theta = -\frac{1}{2}$ $210°$ & $330°$ $\frac{7\pi}{6}$ & $\frac{11\pi}{6}$	38. $\cot\theta = undefined$ $0°$ & $180°$ 0 & π

Use the function value to find the indicated trigonometric value in the specified quadrant.

39. $\cos\theta = \frac{5}{8}$ in quadrant I. $\csc\theta = ?$ $\frac{hyp}{opp}$  $\csc\theta = \frac{8}{\sqrt{39}} = \frac{8\sqrt{39}}{39}$	40. $\sec\theta = -\frac{9}{4}$ (hyp, adj) in quadrant III. $\cot\theta = ?$ $\frac{adj}{opp}$  $\cot\theta = \frac{-4}{\sqrt{65}} = \frac{-4\sqrt{65}}{65}$