MATH-8 TEST Unit 2
SAMPLE

100 points **NAME:**________________

This test is in two parts. On part one, you may not use a calculator; on part two, a (non-graphing) calculator is necessary. When you complete part one, you turn it in and get part two. Once you have turned in part one, you may not go back to it. You will show all work on the test paper, no scratch paper is allowed.

PART ONE - NO CALCULATORS ALLOWED

(1) Find each of the following: (2 points each)

(a) cos (315°) = $\sqrt{2}/2$

(b) sin (π) = 0

(c) tan (330°) = $-\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

(d) cot (- π/2)= 0

(e) tan (90°) = undefined

(f) sec (π/4) = $\sqrt{2}$

(g) csc (390°) = 2

(h) cos (7π/6) = $-\sqrt{3}/2$

(i) sin (-150°) = $-1/2$

(j) tan (- π/6)= $-\sqrt{3}/3$

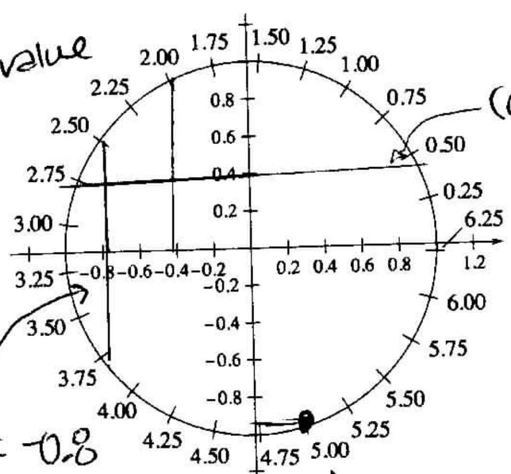
(2) Use the figure to (4 points)

(a) approximate the value of sin 5 $-.95$ cos 2 -0.4

(b) find a value of t such that cost ~ -0.8 2.5

(c) find a value of t such that sint ~ 0.4 0.4

(a)
input 2
cos(2) is x value



(c) Sint = 0.4
where on circle is y = 0.4
Many answers... one given

(b)
cost = -0.8
where on circle is
x = -0.8
Infinitely many answers, problem only asks for one

(a) input
sin(5) is y value

NAME: ______

MATH 8 Sample Test 2

PART TWO - CALCULATORS ALLOWED (non-graphing)

Show your work on this paper. EXACT answers are expected unless otherwise specified. Show scales on graphs and label highs and lows. Give units in answers when appropriate.

Fill in the blanks. (2 points each)

(1) f(t) = cost Is even, odd, or neither even

(2) What is the amplitude of $f(t) = -\frac{1}{2}\sin(3t+\pi) - 4$? 1/2

(3) If the point (-3, 7) is on the terminal side of θ, find sinθ $= \frac{y}{r} = 7/\sqrt{58}$ $r^2 = (-3)^2 + 7^2 = 58$

(4) In which quadrant, if any, is $\tan\theta < 0$ AND $\sin\theta > 0$ (both true) 2

(5) The domain of f(t)=tan(t) is $t \neq \pi/2 + \pi K$, K is an integer

(6) Using your calculator, find approximations for the following, correct to 3 decimal places. (1 point each)

(a) sec 39° ≈ 1.287

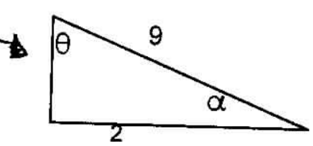
(b) $\tan(-3\pi/8)$ ≈ −2.414

(c) $\frac{4}{\tan 12^\circ + 7}$ ≈ 0.555

(d) cos 4 ≈ −0.654

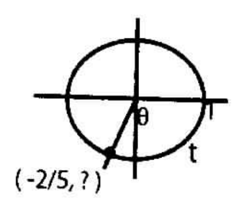
(7) Given the following right triangle, find sinα, , cscθ, tanθ. (1 point each)

pythag.
$\sqrt{81-4}$
$\sqrt{77}$



sinα= $\frac{\sqrt{77}}{9}$ cscθ= $\frac{9}{2}$ tanθ = $\frac{2}{\sqrt{77}}$

(8) Given the unit circle below with the coordinates of $P\left(-\frac{2}{5}, ?\right)$, find sinθ , tant. (2 point each)



$x^2 + y^2 = 1$

$\left(-\frac{2}{5}\right)^2 + y^2 = 1$

$y^2 = 1 - \frac{4}{25} = \frac{21}{25}$

$y = \pm \frac{\sqrt{21}}{5}$

In Q3, y<0 so $\left(-\frac{2}{5}, \frac{-\sqrt{21}}{5}\right)$

sinθ= $\frac{-\sqrt{21}}{5}$ tant = $\frac{\sqrt{21}}{2}$

(9) Given cos θ = $\frac{-5}{13}$ and θ is in Quadrant II, find: (2 points each)

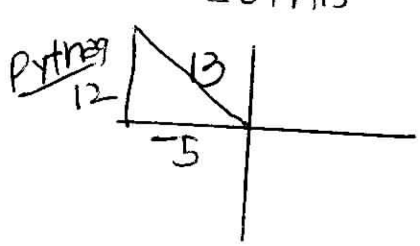
(a) sin θ = 12/13

$\frac{y}{r}$

Many ways to do this

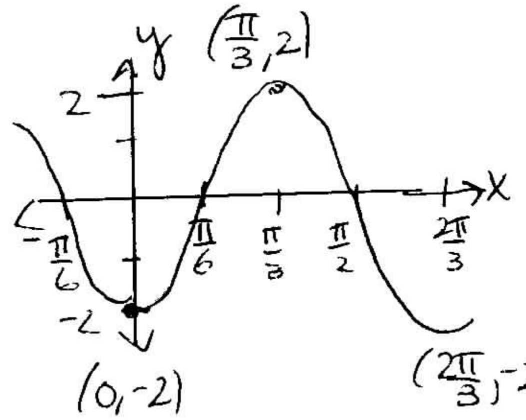
(b) sec θ -13/5

recip of cosine



(10) Sketch the following graphs. (clearly show scale, graph at least one period, label coordinates of highs and lows) (4 points)

$g(x) = -2\cos(3x)$



Amp = 2

$\text{period} = \frac{2\pi}{|\omega|} = \frac{2\pi}{3}$

(scale) $\frac{1}{4}\text{ period} = \frac{1}{4}\cdot\frac{2\pi}{3} = \frac{\pi}{6}$

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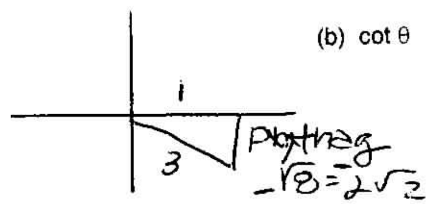
(11) Given sec θ = 3 and tan θ< 0 find: $\Rightarrow$ Q4 (2 points each)

(a) sin θ = $-2\sqrt{2}/3$



(b) cot θ $\frac{-1}{2\sqrt{2}} = \frac{-\sqrt{2}}{4}$

either is ok

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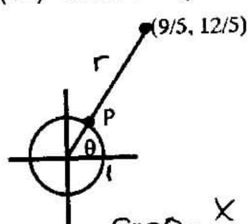
(12) Given the figure below, with point P on the unit circle, find (2 points each)



$r^2 = \left(\frac{9}{5}\right)^2 + \left(\frac{12}{5}\right)^2 = \frac{225}{25} = 9 \Rightarrow r = 3$

P coordinates are (cosθ, sinθ)

$\cos\theta = \frac{x}{r} = \frac{9/5}{3} = 3/5$ $\quad \tan\theta = \frac{12/5}{9/5} = \frac{12}{9} = \frac{4}{3}$ $\quad \sin\theta = \frac{y}{r} = \frac{12/5}{3} = \frac{4}{5}$

(a) cos θ = $3/5$

(b) tanθ = $4/3$

(c) coordinates of point P $(3/5, 4/5)$

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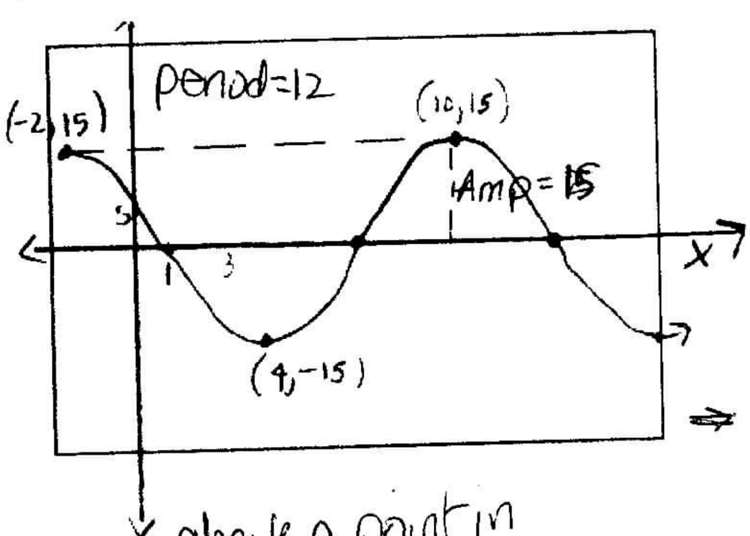
(13) Find an equation corresponding the graph below. Check a point. (4 points)



check a point in equation

period = 12

$\frac{2\pi}{\omega} = 12 \Rightarrow \omega = \frac{\pi}{6}$

Many possible answers

$y = 15\cos\left(\frac{\pi}{6}(x+2)\right)$

$\Rightarrow y = 15\cos\left(\frac{\pi}{6}x + \frac{\pi}{3}\right)$

OR

$y = -15\sin\left(\frac{\pi}{6}(x-1)\right)$

$y = -15\sin\left(\frac{\pi}{6}x - \frac{\pi}{6}\right)$

(14) A person sitting at the top of a 200 foot cliff at the edge of the ocean observes a ship directly offshore. The angle of depression from the person to the ship is 23 degrees. How far is the ship from shore (exact and approximate). (3 points)

Recall- Angle of depression is measured from horizontal

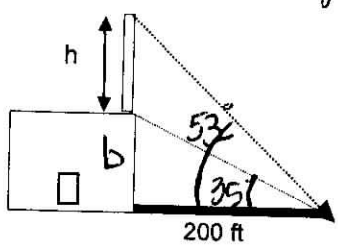
$\frac{x}{200} = \tan 67°$

$x = 200\tan 67°$ ft (exact)

$x \approx 471.2$ ft

(15) At a point on the ground 200 feet from the base of a building, the angle of elevation to the bottom of a smokestack on the top of the building is 35°, and the angle of elevation to the top of the smokestack is 53°. Find the height, h, of the smokestack exactly.

let b = ht. of building



$\frac{b}{200} = \tan 35°$ $\quad \frac{h+b}{200} = \tan 53°$ (5 points)

$b = 200\tan 35°$ $\quad h+b = 200\tan 53°$

$h = 200\tan 53° - b$

don't use calculator yet.

$h = 200\tan 53° - 200\tan 35°$ ft (exact)

$h \approx 125.4$ ft

(16) Solve the following trig equations. If not restriction is given then find all solutions (2 pts each)

$\tan(t) = -1$ for $0 \le t < 2\pi$ $\quad$ $3\pi/4,\ 7\pi/4$

$\sec(x) = -2$ for $0 \le x < 2\pi$ $\quad$ $2\pi/3,\ 4\pi/3$ $\quad \cos x = -\frac{1}{2}$

$\cos(t) = \frac{\sqrt{3}}{2}$ $\quad$ $\frac{\pi}{6} + 2\pi k,\ \frac{11\pi}{6} + 2\pi k$

k is an integer

$\sin(t) = 0$ $\quad$ πk

$k \in \mathbb{Z}$

$\sin(t) = \frac{-\sqrt{2}}{2}$ for $\frac{-\pi}{2} \le t \le \frac{\pi}{2}$ $\quad$ $-\pi/4$

$\tan(t) = \sqrt{3}$ for $0 \le t < 4\pi$ $\quad$ $\frac{\pi}{3}, \frac{4\pi}{3}, \frac{7\pi}{3}, \frac{10\pi}{3}$

(17) Simplify: $\dfrac{\tan\theta + \cot\theta}{3\sec\theta\csc\theta}$ (simplifies to a number) (2 points)

$$\frac{\tan\theta + \cot\theta}{3\sec\theta\csc\theta} = \frac{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}}{3\frac{1}{\cos\theta}\frac{1}{\sin\theta}} \cdot \frac{\cos\theta\sin\theta}{\cos\theta\sin\theta} = \frac{\sin^2\theta + \cos^2\theta}{3} = \frac{1}{3}$$

(18) Prove the following Identity $1 - \dfrac{\sin^2\theta}{1+\cos\theta} = \cos\theta$ (5 points)

$$1 - \frac{\sin^2\theta}{1+\cos\theta} = 1 - \frac{1-\cos^2\theta}{1+\cos\theta} = 1 - \frac{(1-\cos\theta)\cancel{(1+\cos\theta)}}{\cancel{(1+\cos\theta)}} = 1 - (1-\cos\theta) = \cos\theta$$

Start be re-writing original LHS without change

$$\therefore\ 1 - \frac{\sin^2\theta}{1+\cos\theta} = \cos\theta$$

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(19) $f(x) = 4\sin\left(\frac{1}{2}x + \frac{\pi}{6}\right)$ (6 points)

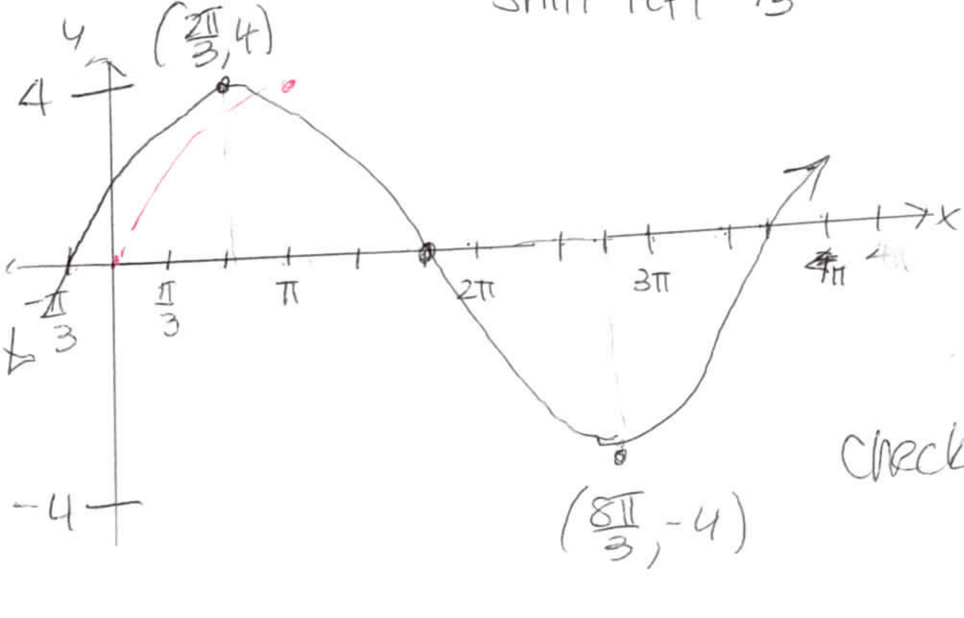
$f(x) = 4\sin\left(\frac{1}{2}\left(x + \frac{\pi}{3}\right)\right)$

Amp = 4

period = $\frac{2\pi}{1/2} = 4\pi$

1/4 period = π (every 3 squares on my scale)

shift left $\pi/3$



check point in equation