Hour: _____

Honors Algebra 2B Final Exam Review Part 1

Name: KEY

Date: _____

1. Evaluate each of the following.

a) $\cot\frac{17\pi}{3}$ $\frac{\sqrt{3}}{3}$

b) $\sin\left(-\frac{14\pi}{6}\right)$ $\frac{\sqrt{3}}{2}$

c) $\cos\frac{5\pi}{4}$ $-\frac{\sqrt{2}}{2}$

d) $\csc\frac{45\pi}{15}$ UNDEFINED

e) $\cot\frac{19\pi}{6}$ $\sqrt{3}$

f) $\sin\left(-\frac{7\pi}{6}\right)$ $\frac{1}{2}$

g) $\sec\frac{-12\pi}{4}$ -1

h) $\cos\frac{45\pi}{4}$ $-\frac{\sqrt{2}}{2}$

2. True or false?

a) $\tan^2\alpha = \sec^2\alpha + 1$ FALSE

b) $-\cos^2\frac{3\pi}{7} + 1 = \sin^2\frac{3\pi}{7}$ TRUE

c) $(\cot\phi)^2 + 1 = \csc^2\phi$ TRUE

d) $1 = \frac{1}{\cos^2 x} - \frac{1}{\cot^2 x}$ TRUE

e) $\cos^2\frac{3\pi}{7} + \sin^2\frac{3\pi}{7} + 1 = 0$ FALSE

f) $\frac{1}{\cos^2 x} + \frac{1}{\sin^2 x} = 1$ FALSE

3. Which angle is NOT co-terminal with the others?

A. $\frac{5\pi}{6}$ B. $\frac{-19\pi}{6}$ C. 510° D. $\frac{7\pi}{6}$

Honors Algebra 2B Final Exam Review Part 1

4. An angle drawn in standard position has a terminal side that passes through the point $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$.

What is one possible measure of the angle?

240° $\frac{4\pi}{3}$

5. An angle of -120° is in standard position. What are the coordinates of the point at which the terminal side intersects the unit circle?

$\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

6. What is the exact value of $\cos\left(-\frac{5\pi}{4}\right)$? $-\frac{\sqrt{2}}{2}$

7. What is the exact value of $\tan\frac{2\pi}{3}$? $-\sqrt{3}$

8. Find the exact value of $\tan\left(\frac{-\pi}{6}\right)$. $-\frac{\sqrt{3}}{3}$

Find the Exact Value of each function:

9. $\cos 120^\circ - \cos\frac{\pi}{3}$ -1

10. $1-\left(\cos 210^\circ\right)^2$ $\frac{1}{4}$

11. If $\sec\theta = \frac{1}{\cos\theta}$, then what is: $\left(\sec\frac{5\pi}{6}\right)^2 - \left(\tan\frac{5\pi}{6}\right)^2$? 1

12. If $\cot\theta = \frac{\cos\theta}{\sin\theta}$, then what is: $\cot\frac{-17\pi}{6}$? $\sqrt{3}$

13. Which angle, in standard position, is NOT coterminal with the others?

No solution

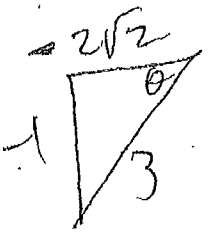
A. -190° B. 170° C. 190° D. 550°

14. An angle drawn in standard position has a terminal side that passes through the point $\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$.

What are TWO possible measures of the angle, in standard position?

315° $\frac{7\pi}{4}$

15. Given that $\cos\theta < 0$, find the other five trigonometric ratios for θ.



$\sin\theta = -\frac{1}{3}$	$\csc\theta = -3$
$\cos\theta = -\frac{2\sqrt{2}}{3}$	$\sec\theta = -\frac{3\sqrt{2}}{4}$
$\tan\theta = \frac{\sqrt{2}}{4}$	$\cot\theta = 2\sqrt{2}$

Verify. You may only work one side of the equation.

16. $\sin\theta + \cos\theta = \dfrac{\cot\theta + 1}{\csc\theta}$

$$\frac{\frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\sin\theta}}{\frac{1}{\sin\theta}}$$

$$\frac{\cos\theta + \sin\theta}{\sin\theta} \cdot \frac{\sin\theta}{1}$$

$$\cos\theta + \sin\theta$$

17. $(\sec\phi - \tan\phi)^2 = \dfrac{1-\sin\phi}{1+\sin\phi}$

$$\frac{1-\sin\phi}{1+\sin\phi} \cdot \frac{1-\sin\phi}{1-\sin\phi}$$

$$\frac{(1-\sin\phi)^2}{1-\sin^2\phi}$$

$$\frac{1 - 2\sin\phi + \sin^2\phi}{\cos^2\phi}$$

$$\frac{1}{\cos^2\phi} - \frac{2\sin\phi}{\cos^2\phi} + \frac{\sin^2\phi}{\cos^2\phi}$$

$$\sec^2\phi - 2\sec\phi\tan\phi + \tan^2\phi$$

$$(\sec\phi - \tan\phi)^2$$

Pre-Calculus B Final Exam Review Part 2

(18)

a) $\sin\theta = -\frac{\sqrt{3}}{2}$ $\frac{4\pi}{3}, \frac{5\pi}{3}$

b) $\csc\theta = 2$ $\frac{\pi}{6}, \frac{5\pi}{6}$

c) $\cos\theta = -\frac{\sqrt{2}}{2}$ $\frac{3\pi}{4}, \frac{5\pi}{4}$

d) $\sec\theta = 0$ no solution

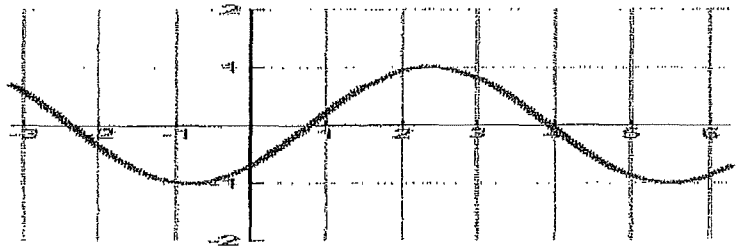
e) $\tan\theta = \frac{\sqrt{3}}{3}$ $\frac{\pi}{6}, \frac{7\pi}{6}$

f) $\cot\theta$ is undefined $0, \pi$

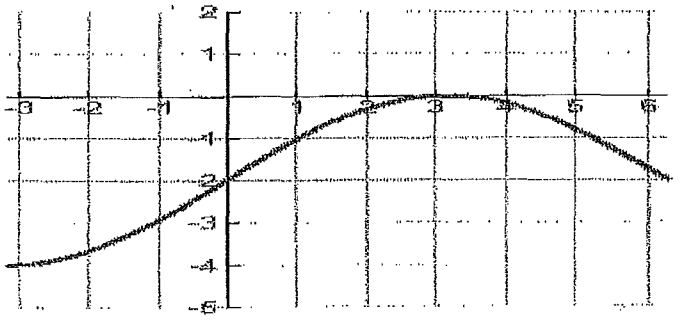
(19)

Draw the graph of each function over the interval $[-\pi, 2\pi]$. Identify the period and amplitude. Show necessary critical points. It may help to begin by graphing the parent function with a dashed line.

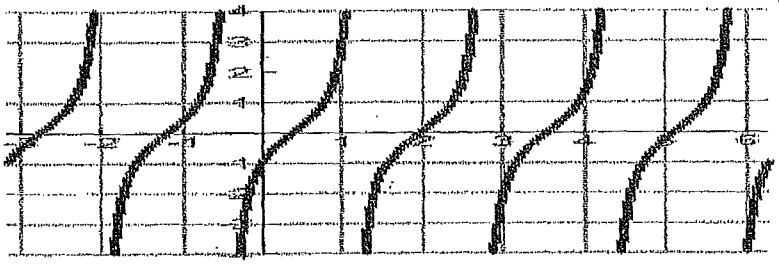
a) $y = -\cos\left(x + \frac{\pi}{4}\right)$



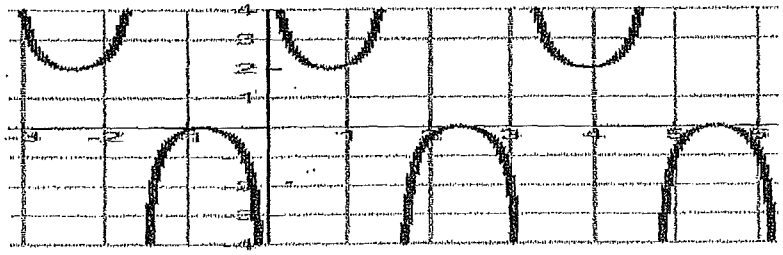
b) $h(t) = 2\sin\left(\frac{t}{2}\right) - 2$



c) $y = \tan\left(2x - \frac{\pi}{4}\right)$



d) $h(t) = \csc(2t) + 1$



Verify. You may only work one side of the equation.

20 a) $\csc\phi \tan\phi = \sec\phi$

$\frac{1}{\sin\phi} \cdot \frac{\sin\phi}{\cos\phi}$

$\frac{1}{\cos\phi}$

SECφ

c) $\frac{\sin\alpha}{\csc\alpha} + \frac{\cot^2\alpha}{\csc^2\alpha} = 1$

$\sin^2\alpha + \cos^2\alpha$

1

Pre-Calculus B Final Exam Review Part 2

b) $\dfrac{1+\dfrac{\sin^2\theta}{\cos^2\theta}}{\dfrac{\cos^2\theta}{\sin^2\theta}+1} = \tan^2\theta$

$\dfrac{1+\tan^2\theta}{1+\cot^2\theta}$

$\dfrac{\sec^2\theta}{\csc^2\theta}$

$\dfrac{\sin^2\theta}{\cos^2\theta}$

$\tan^2\theta$

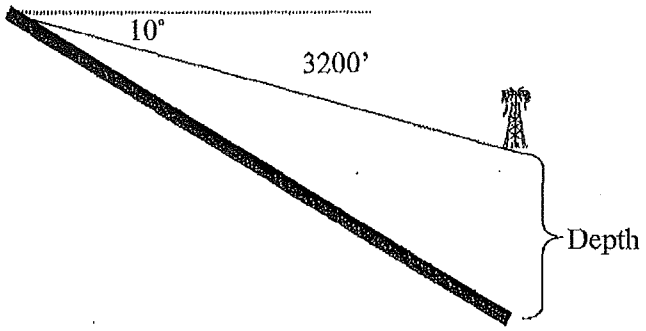
d) $\sin^{\frac{1}{2}}x\cos x - \sin^{\frac{5}{2}}x\cos x = \cos^3 x\sqrt{\sin x}$

$\sin^{\frac{1}{2}}x\cos x(1-\sin^2 x)$

$\sqrt{\sin x}\cos x\cos^2 x$

$\cos^3 x\sqrt{\sin x}$

21) An oil well is to be located on a hillside that slopes at 10° from the horizontal. The desired rock formation has a dip of 27° to the horizontal in the same direction as the hill slope. The oil well is located 3200 feet downhill from the nearest edge of the outcropping rock formation. How deep will the driller have to go to reach the top of the rock formation?



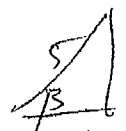
1052 FT

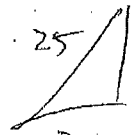
Honors Algebra 2B Final Exam Review Part 1

22. Given: β and α are both in the first quadrant: $\sin\beta = \frac{3}{5}$ and $\cos\alpha = \frac{7}{25}$

Verify:

$$\cos\alpha + \cos\beta = 2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$$





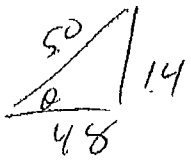
$\beta = \sin^{-1}\left(\frac{3}{5}\right)$ $\quad \alpha = \cos^{-1}\left(\frac{7}{25}\right)$

$\beta = 36.9^\circ$ $\quad \alpha = 73.7^\circ$

$\frac{7}{25} + \frac{4}{5} = 2\cos\left(\frac{73.7+36.9}{2}\right)\cos\left(\frac{73.7-36.9}{2}\right)$

$1.08 = 1.08$

23. Given: $\cot\theta = \frac{48}{14}$, Find: a) $\sin 2\theta$ b) $\cos\frac{\theta}{2}$



$2\sin\theta\cos\theta$

$2\left(\frac{14}{50}\right)\left(\frac{48}{50}\right)$

0.5376

$\sqrt{\frac{1+\frac{48}{50}}{2}}$

$\sqrt{\frac{\frac{98}{50}}{2}}$ ...

$\sqrt{\frac{98}{100}}$

24. Find all of the exact solutions on the interval: $[0, 2\pi)$.

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

$\sin x\cos\frac{\pi}{4} + \cos x\sin\frac{\pi}{4} + \sin x\cos\frac{\pi}{4} - \cos x\sin\frac{\pi}{4} = -1$

$2\sin x\cos\frac{\pi}{4} = -1$

$2\sin x\left(\frac{\sqrt{2}}{2}\right) = -1$

$\sin x = -\frac{\sqrt{2}}{2}$

$x = \frac{5\pi}{4}, \frac{7\pi}{4}$

c) $\sin 5x + \sin x = 0$

$2\sin\left(\frac{5x+x}{2}\right)\cos\left(\frac{5x-x}{2}\right) = 0$

$2\sin 3x\cos 2x = 0$

$\sin 3x = 0$ $\quad \cos 2x = 0$

$3x = 0$ $\quad 3x = \pi$ $\quad 2x = \frac{\pi}{2}$ $\quad 2x = \frac{3\pi}{2}$

$x = 0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

$\cos^2\theta = \frac{1+\cos 2\theta}{2}$ $\quad \theta = \frac{x}{2}$

b) $2-\sin^2 x = 2\cos^2\frac{x}{2}$

$2-\sin^2 x - 2\left(\frac{1+\cos 2\left(\frac{x}{2}\right)}{2}\right)$

$2-(1-\cos^2 x)-(1+\cos x) = 0$

$\cos^2 x - \cos x = 0$

$\cos x(\cos x - 1) = 0$

$\cos x = 0$ $\quad \cos x - 1 = 0$

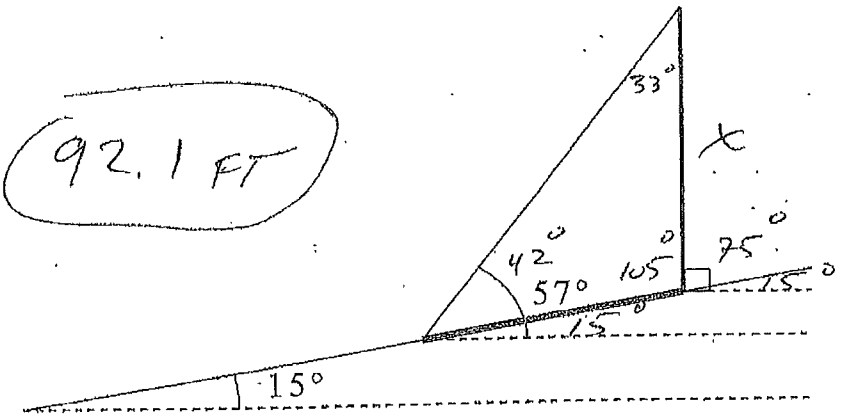
$\cos x = 1$

$x = 0, \frac{\pi}{2}, \frac{3\pi}{2}$

25. A vertical pole is at the side of a straight road that makes an angle of 15° with the horizontal. When the angle of elevation of the sun is 57°, the pole casts a shadow 75 feet long directly down the road, as shown in the figure. Approximate the length of the pole.

$\frac{75}{\sin 33} = \frac{x}{\sin 42^\circ}$

92.1 FT



26. Given: $x^5 - 32 = 0$, solve for the five roots

$r = 32 \quad \theta = 0$

$\sqrt[5]{32}\left(\cos\frac{0+2\pi k}{5} + i\sin\frac{0+2\pi k}{5}\right)$

2

$-1.62 + 1.18i$

$0.62 - 1.9i$

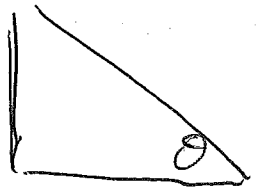
$0.62 + 1.9i$

$-1.62 - 1.18i$

27. Evaluate using DeMoivre's Theorem to be eligible for any amount of credit. Use of another method cannot be used:

$\left[\left(-\sqrt{3}+2i\right)^5\right]$

$r = \sqrt{7}$



$(\sqrt{7})^5(\cos 5(130.9^\circ) + i\sin(130.9^\circ))$

$(\sqrt{7})^5(0.414 - 0.91i)$

$\theta = \tan^{-1}\left(\frac{2}{-\sqrt{3}}\right)$

$\theta = -49.1$

$+180$

130.9°

28. Find: $\frac{z_1}{z_2}$ and $z_1 \cdot z_2$

$Z_1 = 36(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3})$ $\quad Z_2 = 9(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4})$

$\frac{z_1}{z_2} = \frac{36}{9}\left(\cos\left(\frac{2\pi}{3} - \frac{3\pi}{4}\right) + i\sin\left(\frac{2\pi}{3} - \frac{3\pi}{4}\right)\right)$

$4\left(\cos\left(\frac{-\pi}{12}\right) + i\sin\left(\frac{-\pi}{12}\right)\right)$

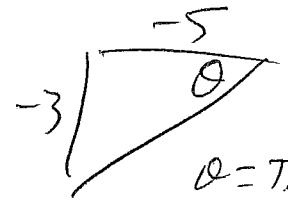
$3.864 - 1.035i$

$z_1 \cdot z_2 = 36(9)\left(\cos\left(\frac{2\pi}{3} + \frac{3\pi}{4}\right) + i\sin\left(\frac{2\pi}{3} + \frac{3\pi}{4}\right)\right)$

$-83.86 - 312.96i$

29. Express in complex trigonometric form: $z = -5 - 3i$

$\sqrt{34}(\cos(211^\circ) + i\sin(211^\circ))$



$r = \sqrt{34}$

$\theta = \tan^{-1}\left(\frac{-3}{-5}\right)$

$= 31$

$+180$

211

Honors Algebra 2B Final Exam Review Part 1

30. Express in standard complex form: $6(\cos \frac{21\pi}{4} + i \sin \frac{21\pi}{4})$

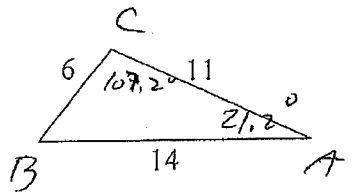
$6\left(\left(\frac{-\sqrt{2}}{2}\right) + i\left(\frac{-\sqrt{2}}{2}\right)\right)$

$-3\sqrt{2} - 3\sqrt{2}i$

31. a) What is the value of all the angles?

b) Calculate the area of the triangle using the Law of Sines

c) Calculate the area of the triangle using Heron's Formula



a)

$14^2 = 6^2 + 11^2 - 2(6)(11)\cos C$

$C = 107.2°$

$\frac{\sin 107.2°}{14} = \frac{\sin A}{6}$

$A = 21.2°$

$B = 48.6°$

b)

$A = \frac{1}{2}(6)(14)\sin(48.6°)$

$= 31.5\ u^2$

c)

$s = \frac{11+14+6}{2} = 15.5$

$A = \sqrt{15.5(15.5-11)(15.5-6)(15.5-14)}$

$= 31.5\ u^2$