Precalculus ACC'12   Name _____SOLUTION Key_____
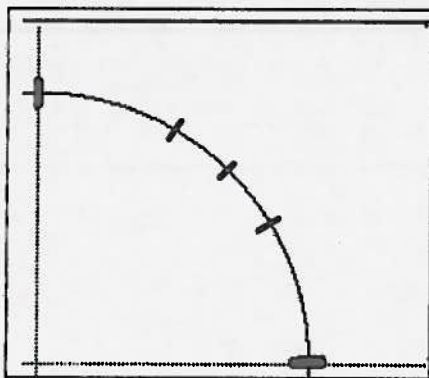Trig Basics
NO CALCULATOR ALLOWED

Round to 3 decimal places.   Show all work.
Multiple Choice (3 pts. each)

Radians	Degree	Cos	Sin
0	0	1	0
$\pi/6$	30	$\sqrt{3}/2$	$1/2$
$\pi/4$	45	$1/\sqrt{2}$	$1/\sqrt{2}$
$\pi/3$	60	$1/2$	$\sqrt{3}/2$
$\pi/2$	90	0	1

7. Find the exact value of the following:

(a) $\sec\dfrac{4\pi}{3}+\tan\dfrac{5\pi}{6}$

$$(-2) + \dfrac{-1}{\sqrt{3}}$$

(b) $\sin\dfrac{7\pi}{4}\cos\dfrac{3\pi}{4}+\csc\dfrac{\pi}{2}\cot\dfrac{3\pi}{2}$

$$\left(\dfrac{-1}{\sqrt{2}}\right)\left(\dfrac{-1}{\sqrt{2}}\right)+1\,(0)$$

$$\dfrac{1}{2}$$

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Part I

1. $\csc\left(\cos^{-1}\dfrac{\sqrt{5}}{5}\right) =$

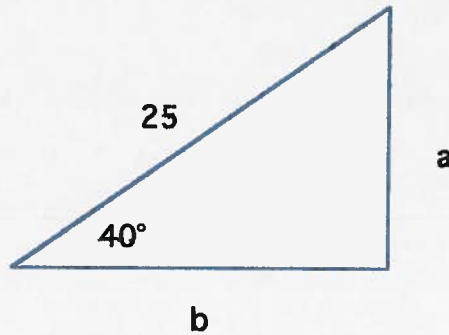a.   2.15   (b.)   1.12   c.   0.89   d.   0.98   e.   1.10

2. Suppose $\vec{v} = 7\vec{i} - \sqrt{6}\vec{j}$. Find the unit vector in the direction of $\vec{v}$.

$|\vec{v}| = \sqrt{7^2 + (\sqrt{6})^2}$
$= \sqrt{49 + 6}$
$= \sqrt{55}$

(a.) $\dfrac{7\sqrt{55}}{55}\vec{i} - \dfrac{\sqrt{330}}{55}\vec{j}$ b. $\vec{v} = 7\vec{i} - \sqrt{6}\vec{j}$ c. $\vec{v} = \dfrac{7}{\sqrt{6}}\vec{i} - \vec{j}$

d. $\vec{v} = \vec{i} - \dfrac{\sqrt{6}}{7}\vec{j}$ e. $\dfrac{\sqrt{301}}{43}\vec{i} - \dfrac{6\sqrt{43}}{43}\vec{j}$

3. In the triangle shown, which of the following best approximates a?

$\sin 40 = \dfrac{a}{25}$
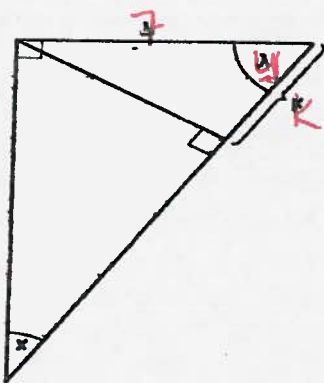
$25\sin 40° = a$

(a.)   16.07   b.   19.15   c.   20.98

d.   32.64   e.   38.89

4. If $f(x,y)=\tan x-\tan y$ and $g(x,y)=1+\tan x\cdot\tan y$, then, in radians, $\dfrac{f(1,2)}{g(1,2)}=$

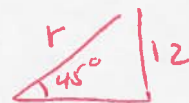a.   0   b.   -0.16   c.   1.58

d.   0.15   e.   -1.56

(handwritten: $\dfrac{\tan 1 - \tan 2}{1 + \tan 1 \, \tan 2}$)

5.   In the figure below, k=

(handwritten: $\cos y = \dfrac{k}{7}$)

a. $7\cos y$ b. $7\cos x$ c. $7\sin y$ d. $\dfrac{7}{\sin x}$ e. $\dfrac{7}{\cos y}$

(handwritten triangle: r, $45°$, 12)

6. An incline makes an angle of 45° with level ground. How many feet up the incline must one go in order to rise 12 feet above the ground?

a. $\dfrac{\sqrt{2}}{12}$ b. $\dfrac{12}{\sqrt{2}}$ c.   12   d. $12\sqrt{2}$ e.   24

7. What is the measure of an angle whose sine is twice the sine of 30°?

a.   30°   b.   60°   c.   90°   d.   120°   e.   No such angle

(handwritten: $\sin\theta = 2\sin 30 = 2(\tfrac{1}{2})=1$)

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Name _Solution Key_

Part II – Calculator allowed.
Round answers to three decimals.

1. $(5, -7)$ is on the terminal side of A. Find the six **exact** trig values:

$r = \sqrt{74}$

$\sin A = -7/\sqrt{74}$

$\csc A = -\sqrt{74}/7$

$\cos A = 5/\sqrt{74}$

$\sec A = \sqrt{74}/5$

$\tan A = -7/5$

$\cot A == -5/7$

2. If $\csc B = 13/5$ in QII, find the other five **exact** trig values:

$\sin B = 5/13$

$\csc B = 13/5$

$\cos B = -12/13$

$\sec B = -13/12$

$\tan B = -5/12$

$\cot B == -12/5$

3. What are the approximate values, in degrees of A and B (from #1 and #2)?

$A = \underline{\quad -54.462 \pm 360n \quad}$

$B = \underline{\quad 157.380 \pm 360n \quad}$

4. (a) Find the approximate values of:

tan 42 $= 2.291$ sin 42° $= .669$ csc 42 $= -1.091$

(b) Find the approximate values (in degrees) of:

sin⁻¹ (-.639)= $\begin{cases} -39.717 \pm 360n \\ 219.717 \pm 360n \end{cases}$ sec⁻¹ (3.72)= $\begin{cases} \pm 74.406 \pm 360n \end{cases}$

tan⁻¹ (1.43)= $\begin{cases} 55.035 \pm 360m \\ 235.035 \pm 360n \end{cases}$ csc⁻¹ (-.362)= $\begin{cases} \text{NO SOLUTION} \end{cases}$

5. A boat sales 60 mph at a bearing of 200°. The current flows 9 mph at 112°.
Find the magnitude and bearing of the resultant vector.

$60\cos 200 \vec{\imath} + 60\sin 200 \vec{\jmath}$
$9\cos 112 \vec{\imath} + 9\sin 112 \vec{\jmath}$
―――――――――――――
$-59.753 \vec{\imath} - 12.177 \vec{\jmath}$

60.981 mph

$|\vec{r}| = \sqrt{59.753^2 + 12.177^2} = \cancel{60.984 \text{ mi}}$

$\theta = -\cos^{-1}\left(\dfrac{-59.753}{60.481}\right) = -168.482$

6. Identify the quadrant and reference angle of :

(a) 985°   III $\theta_{ref} = 85$

(b) -713°   I   7°

(c) -1731°   I   69°

(d) 893°   II   7°