Eastern Oregon University Concurrent Enrollment/Credit by Proficiency Program

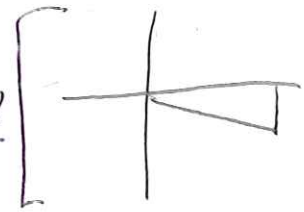
Math 112, Spring, 2016 Exam 1 name: Key

Show any relevant work. For each problem, circle your answer

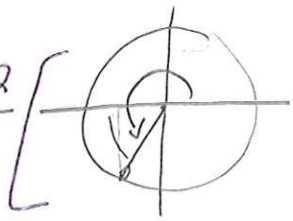
1. (5 points each) Find the exact value of each of the following. Include a reference angle sketch.

a. $\cos\left(-\frac{\pi}{6}\right)$

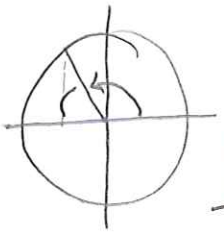
$= \frac{\sqrt{3}}{2}$] +3

+2 

b. $\sec\frac{4\pi}{3} = \underbrace{\frac{1}{\cos\frac{4\pi}{3}}}_{+1} = \frac{1}{-\frac{1}{2}} = -2$] +2

+2 

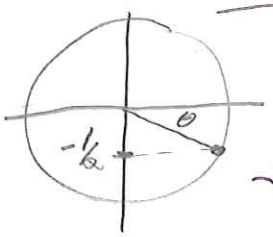
c. $\tan\frac{2\pi}{3} = \frac{\sin\frac{2\pi}{3}}{\cos\frac{2\pi}{3}} = \frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$] +2



+2

$= \frac{\sqrt{3}}{2}\cdot\left(-\frac{2}{1}\right) = -\sqrt{3}$] +1

d. $\sin^{-1}(-\frac{1}{2}) = -\frac{\pi}{6}$] +3

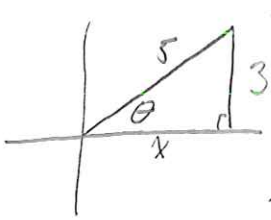


+2

e. $\cos\left(\sin^{-1}\left(\frac{3}{5}\right)\right)$

$= \frac{4}{5}$] +1

+2 [$x^2+3^2=5^2$, $x^2=16$, $x=4$]



+2

+2 for correct conversion, +2 for units

2. (12 points) For each angle below, change degrees to radians and radians to degrees:

4 a. $-220°$

$-\cancel{220}^{11}\left(\frac{\pi}{\cancel{180}^{9}\,°}\right)$

$-\frac{11\pi}{9}$ rad

4 b. $4\pi/3$ rad

$\frac{4\pi}{\cancel{3}}\cdot\frac{\cancel{180}^{60}\,°}{\cancel{\pi}}$

$= 240°$

4 c. $540°$

$\cancel{540}^{3}\left(\frac{\pi}{\cancel{180}^{1}\,°}\right)$

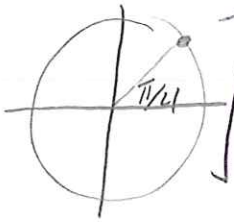
$= 3\pi$ rad

3. (6 points) Find two angles, one positive and one negative, which are coterminal with $\frac{\pi}{4}$.

$\frac{\pi}{4} + 2\pi = \frac{9\pi}{4}$ +3

$\frac{\pi}{4} - 2\pi = -\frac{7\pi}{4}$ +3

other answers possible

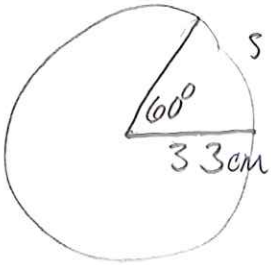


+2, but not required

4. (6 points) Find the length of an arc subtending a central angle of 60° in a circle of radius 33 cm.

$s = r\theta$ with θ in radians

$60° = \frac{\pi}{3}$ rad +3



+2 but not required

$s = \cancel{33}^{11}\,\text{cm}\left(\frac{\pi}{\cancel{3}}\right) = 11\pi$ cm

+3 units required.

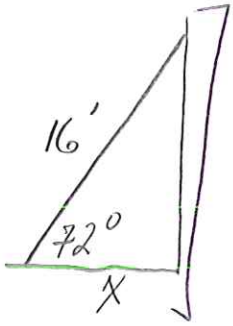
5. (12 points) A 16 foot ladder leans against a vertical wall; the angle between the ladder and the ground is 72°. How far is the base of the ladder from the wall?

$\frac{x}{16} = \cos 72°$ +6

$x = 16\cdot\cos 72°$ +2

$x \approx 4.94$ feet

+2 +2

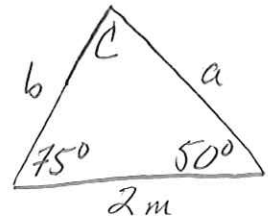


+4, not required

6. (12 points) Solve each triangle below. Sketch appropriate triangles labeled such that side a is opposite angle A, side b opposite angle B, and side c opposite angle C.

6 a. $A = 75°$, $B = 50°$, $c = 2$ meters.

$C = 180° - (75° + 50°) = 55°$] + 1



$\frac{\sin 75°}{a} = \frac{\sin 55°}{2} = \frac{\sin 50°}{b}$

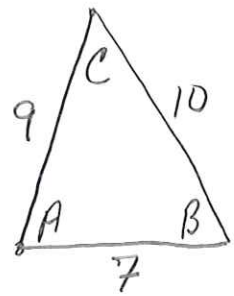
$a = \frac{2 \cdot \sin 75°}{\sin 55°} \approx 2.36 \text{ m}$] + 3

$b = \frac{2 \cdot \sin 50°}{\sin 55°} \approx 1.87 \text{ m}$] + 2

3 points for first one correct, 2 points for second

6 b. $a = 10$, $b = 9$, $c = 7$

$10^2 = 9^2 + 7^2 - 2 \cdot 9 \cdot 7 \cdot \cos A$



$100 - (81 + 49) = -126 \cos A$

$\frac{-30}{-126} = \cos A$, $A = \cos^{-1}\left(\frac{30}{126}\right)$

$A \approx 76.2°$] + 3

$\frac{\sin B}{9} = \frac{\sin 76.2°}{10} \Rightarrow B = \sin^{-1}\left(\frac{9}{10} \sin 76.2°\right) \approx 60.9°$] + 2

$C = 180 - (A + B) = 42.9°$] + 1

7. (12 points) Find the area of the triangle given in 6a above.

$A = \frac{1}{2} a \cdot b \sin \theta = \frac{1}{2}(2.36)(1.87) \cdot \sin 55°$] + 3

+ 3

other sides and angles O.K.

$\approx 1.8 \text{ m}^2$ + 3

+ 3

8. (15 points) If $\cos\theta = 5/7$ and $\sin\theta < 0$, find the values of the other five elementary trigonometric functions at θ. Draw a sketch with appropriate reference angle.

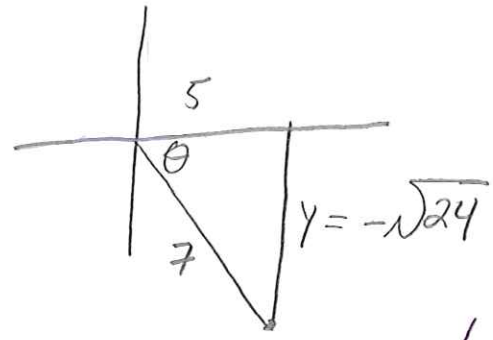
a. $\sin\theta =$

$= -\frac{\sqrt{24}}{7}$ +3

$y^2 + 5^2 = 7^2$

$y^2 = 49 - 25 = 24$

$y = -\sqrt{24}$



+3

b. $\sec\theta =$ $\frac{7}{5}$ +2

c. $\csc\theta =$ $-\frac{7}{\sqrt{24}}$ +2

d. $\tan\theta =$ $\frac{-\frac{\sqrt{24}}{7}}{5/7} = -\frac{\sqrt{24}}{\cancel{7}} \cdot \frac{\cancel{7}}{5} = -\sqrt{24}/5$ +3

e. $\cot\theta =$ $-\frac{5}{\sqrt{24}}$ +2