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Eastern Oregon University Concurrent Enrollment/Credit by Proficiency Program

Math 112, Spring, 2014 Exam 1 name: Key

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

+12

1. (12 points) For each angle below, change degrees to radians and radians to degrees:

a. $5\pi/6$ rad

$\frac{5\pi}{6}$ rad $\cdot \frac{180^\circ}{\pi \text{ rad}}$

$= 150^\circ$ +3

b. -300°

$-\cancel{300}^{5} \cdot \frac{\pi \text{ rad}}{\cancel{180}_{3}}$

+3 $= -\frac{5\pi}{3}$ rad

c. $7\pi/2$ rad

$\frac{7\pi}{2}$ rad $\times \frac{\cancel{180}^{90}}{\pi \text{ rad}}$

$= 630^\circ$ +3

d. 765°

$\cancel{765}^{17} \cdot \frac{\pi \text{ rad}}{\cancel{180}_{4}}$

$= \frac{17\pi}{4}$ rad +3

+30

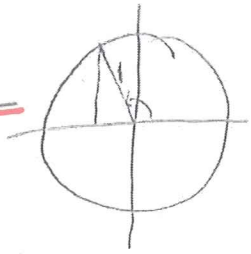
2. (6 points each) Find the exact value of each of the following. Include a circle sketch and reference triangle.

6 a. $\tan(2\pi/3)$

$= -\frac{\sqrt{3}}{2} \Big/ \frac{1}{2} = -\sqrt{3}$

+2 +2

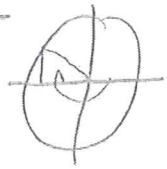
+2



6 b. $\sin(-7\pi/6)$

$= \frac{1}{2}$ +4

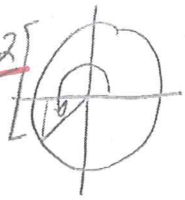
+2



6 c. $\sec\frac{5\pi}{4} = \frac{1}{\cos\frac{5\pi}{4}} = -\frac{1}{\sqrt{2}/2}$ +4

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

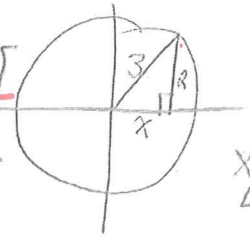
+2



6 d. $\cos(\sin^{-1}\frac{2}{3})$

$= \frac{\sqrt{5}}{3}$ +2

+2



$x^2 = 3^2 - 2^2$

$= 5$

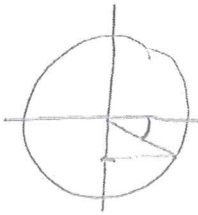
$x = \sqrt{5}$

+2

6 e. $\sin^{-1}(-\frac{1}{2})$

$= -\frac{\pi}{6}$ +2

+2



+2

simplification of fractions not required, but if done it must be correct for full credit

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+10

3. (10 points) A sector of a circle with a central angle measure of $2\pi/3$ rad has area of 5m^2. Find the radius of the circle.

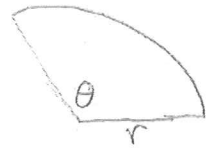
$A = \frac{1}{2} r^2 \theta$

$+4 \left[5\,m^2 = \frac{1}{2} r^2 \frac{2\pi}{3} \right.$

$r^2 = \frac{15}{\pi} m^2$

$\underbrace{r = \sqrt{\frac{15}{\pi}}}_{+4} \underbrace{m}_{+2}$

$\approx 2.185\,m$



decimal approx. OK.

+12

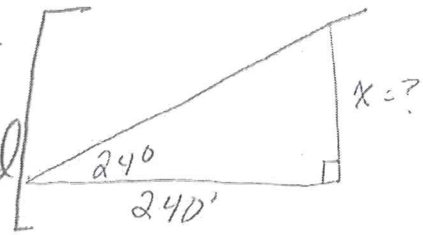
4. (12 points) A ponderosa pine casts a shadow of 240 ft on level ground when the angle of elevation to the sun is 24°. How tall is the tree?

$\frac{x}{240} = \tan 24^\circ \Big] +6$

$x = 240' \cdot \tan 24^\circ \text{ ft}$

$\approx \underbrace{106.855}_{+4}$ feet $\underbrace{}_{2}$

+3 but not required



+12

5. (12 points) If $\cos x = 3/8$ and $\sin x < 0$, find the values of the other five elementary trigonometric functions at x. Draw a sketch with appropriate reference angle.

a. $\sin x = -\frac{\sqrt{55}}{8} \Big] +4$

b. $\sec x = \frac{8}{3} \Big] +2$

c. $\csc x = -\frac{8}{\sqrt{55}} \Big] +2$

d. $\tan x = -\frac{\sqrt{55}}{3} \Big] +2$

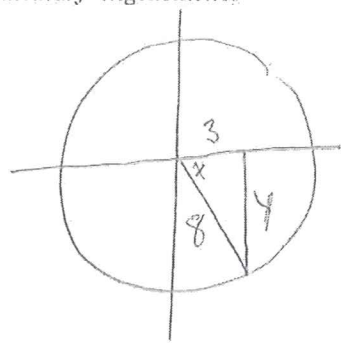
e. $\cot x = -\frac{3}{\sqrt{55}} \Big] +2$

$y^2 + 3^2 = 8^2$

$y^2 = 64 - 9$

$y^2 = 55$

$y = -\sqrt{55}$



If b-e are consistent with a, they can earn full 6 points for these (4 points if sign is wrong.)

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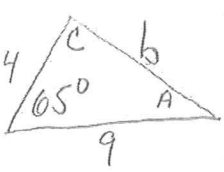
+12

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.

a. $a = 4, \quad c = 9, \quad B = 65°$

$b^2 = 4^2 + 9^2 - 2\cdot 4\cdot 9\cdot \cos 65°$

$b = \sqrt{97 - 72\cos 65°} \approx 8.16$] +2



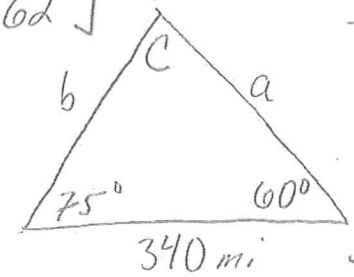
] +1

$\frac{\sin A}{4} = \frac{\sin 65°}{b} \Rightarrow A = \sin^{-1}\left(\frac{4\cdot \sin 65°}{b}\right) \approx 26.38°$] +2

$C = 180° - (65 + 26.38)° \approx 88.62°$] +1

b. $A = 75°, \quad B = 60°, \quad c = 340$ miles

$C = 180° - (75° + 60°) = 45°$] +1



] +1

$\frac{\sin 75°}{a} = \frac{\sin 45°}{340\text{ mi}} = \frac{\sin 60°}{b}$

$a = \frac{\sin 75° \cdot 340\text{ mi}}{\sin 45°} \approx 464.45\text{ mi.}$ +2

$b = \frac{340\text{ mi}\cdot \sin 60°}{\sin 45°} \approx 416.41\text{ mi.}$ +2

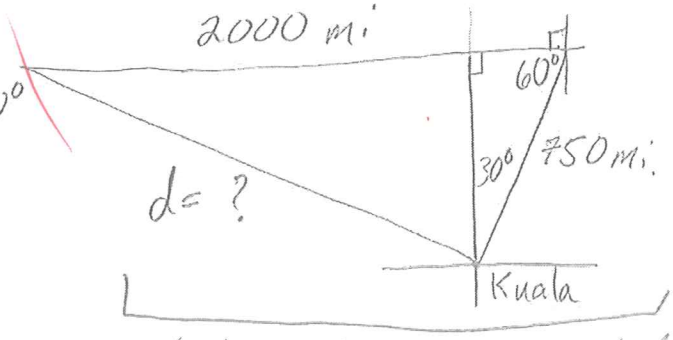
+12

7. (12 points) A commercial jet leaves Kuala Lumpur and flies on a bearing of N 30° E for 90 minutes. The pilot then turns to fly on a bearing of N 90° W and flies on this bearing for 4 hours. If the plane is flying at a constant speed of 500 miles per hour, how far is it from Kuala Lumpur at this time?

+6 [$d^2 = 2000^2 + 750^2 - 2(750)(2000)\cdot\cos 60°$

+4 [$d = \sqrt{3062500}$ mi.]

$= 1750$ miles +2



sketch not necessary, but if correct can earn 6 points

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