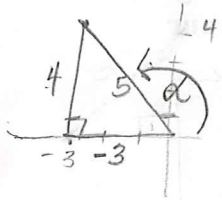
College Trig. Practice Test #2 sections 5.5, 5.6, 6.1, 6.2 Name: Solutions

Show Work on ALL problems and circle answers!

1. Give the exact value of: $\cot\left(\frac{7\pi}{6}\right)$.

$$\frac{\cos\left(\frac{7\pi}{6}\right)}{\sin\left(\frac{7\pi}{6}\right)} = \frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \boxed{\sqrt{3}}$$

2. The terminal side of an angle, α, in standard position passes through the point (-3, 4). Find the exact values of $\sin(\alpha)$, $\cos(\alpha)$ and $\tan(\alpha)$.



$\sin(\alpha) = \frac{4}{5}$ $\cos(\alpha) = -\frac{3}{5}$ $\tan(\alpha) = -\frac{4}{3}$

3. Find β if β is the angle between 90° and 180° whose sec is $\frac{-2\sqrt{3}}{3}$.

$$\sec(\beta) = \frac{-2\sqrt{3}}{3}$$

$$\cos(\beta) = \frac{3}{-2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3}}{-2\cdot 3} = -\frac{\sqrt{3}}{2}$$

$$\boxed{\beta = \frac{5\pi}{6}}$$

Q1

4. Find the exact values for the 5 remaining trigonometric functions if $\cos(\alpha) = \frac{2}{5}$ and $0 < \alpha < \frac{\pi}{2}$.

$\sin^2(\alpha) + \left(\frac{2}{5}\right)^2 = 1$

$\sin^2(\alpha) = 1 - \frac{4}{25}$

$\sin^2(\alpha) = \frac{21}{25}$

$\sin(\alpha) = \frac{\sqrt{21}}{5}$

$\tan(\alpha) = \frac{\frac{\sqrt{21}}{5}}{\frac{2}{5}}$

$\tan(\alpha) = \frac{\sqrt{21}}{2}$

$\cot(\alpha) = \frac{2}{\sqrt{21}} \cdot \frac{\sqrt{21}}{\sqrt{21}}$

$\csc(\alpha) = \frac{5\sqrt{21}}{21}$

$\sec(\alpha) = \frac{5}{2}$

$\cot(\alpha) = \frac{2\sqrt{21}}{21}$

5. From a point on a street the angle of elevation to the top of the Eiffel Tower is 75°. From a point 100 feet closer to the Eiffel Tower the angle of elevation is 80°. **(a) Draw a diagram and label the parts. (b) Find the height of the Eiffel Tower. (c) SHOW ALL WORK! Circle your answer. (d) Round your answer to the nearest foot.**

$\tan(80°) = \frac{y}{x}$

$x\tan(80°) = y$

$x = \frac{y}{\tan(80°)}$

$\tan(75°) = \frac{y}{x+100'}$

$y = (x+100)\tan(75°)$

$y = \left(\frac{y}{\tan(80°)} + 100\right)\tan(75°)$

$y = \frac{y\tan(75)}{\tan(80)} + 100\tan(75)$

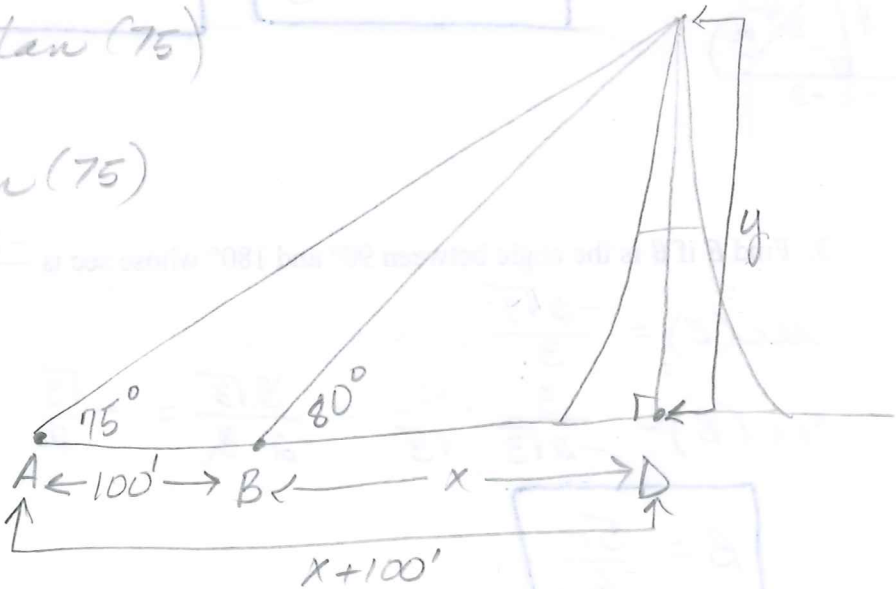
$y - \frac{y\tan(75)}{\tan(80)} = 100\tan(75)$

$y\left(1 - \frac{\tan(75)}{\tan(80)}\right) = 100\tan(75)$

$y = \frac{100\tan(75)}{1 - \frac{\tan(75)}{\tan(80)}}$

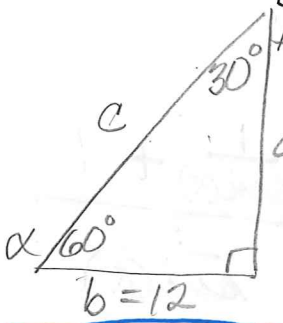
$y = 1091.438398\ldots$

$y \approx 1{,}091'$



Round angles & sides to nearest 10th.

6. Solve the right triangle if $\alpha = 60°$ and side b = 12 inches. Draw a triangle, label the parts and show your work. If you use special△s explain how.



$\tan(60°) = \frac{a}{12}$

$a = 12\tan(60)^\circ$

$a = 20.78460969$

$a \approx 21.8$

$c^2 = a^2 + b^2$

$c^2 = (21.8)^2 + (12)^2$

$c^2 = 475.24 + 144$

$c^2 = 619.24$

$c \approx 24.88453335$

$c \approx 24.9$

$\beta = 30°$

$a = 21.8$

$c = 24.9$

7. Determine if the following function is even, odd, or neither. Verify your answer using algebra.

$$f(x) = csc^3(x) - tan^3(x)$$

$f(-x) = csc^3(-x) - (tan^3(-x)$

$= (csc(-x))^3 - (tan(-x))^3$

$= (-csc(x))^3 - (-tan(x))^3$

$= -csc^3(x) + tan^3(x)$

not even

$-f(x) = f(-x)$

$-f(x) = -csc^3(x) + tan^3(x)$

Odd

8. Simplify the following expressions

$$\frac{tan^2(x)-2\tan(x)+1}{1+\tan(-x)}$$

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

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

$$-(\tan(x)-1)$$

$$\boxed{-\tan(x)+1}$$

9. Is the following equation an identity?

$$\frac{1-sin^2(x)}{1-\sin(x)} = \frac{\csc(x)+1}{\csc(x)}$$

$$\frac{(1+\sin(x))(1-\sin(x))}{(1-\sin(x))} \qquad \frac{\frac{1}{\sin(x)}+1}{\frac{1}{\sin(x)}}$$

$$1+\sin(x) \qquad \left(\frac{1}{\sin(x)}+1\right)\cdot\frac{\sin(x)}{1}$$

$$1+\sin(x)$$

Verify the following identities:

10. $\frac{\tan(\beta)}{\csc(\beta)\sec(\beta)} = 1-cos^2(\beta)$

$$\frac{\frac{\sin B}{\cos B}}{\frac{1}{\sin B}\cdot\frac{1}{\cos(B)}}$$

$$\frac{\sin B}{\cos B}\cdot\frac{\sin(B)\cos(B)}{}$$

$$\sin^2(B)$$

$$\boxed{1-\cos^2(B)}$$

11. $\frac{2}{\sin(\alpha)+1} - \frac{2}{\sin(\alpha)-1} = -4cos^2(\alpha)$

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

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

$$\frac{-4}{\sin^2(\alpha)-1}$$

$$\frac{-4}{\cos^2(\alpha)}$$

They do not match
∴ not an identity.