MSLC – Math 1149
Exam 2 Review

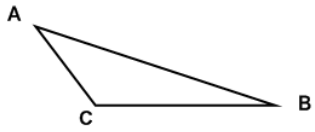
Disclaimer: This should NOT be used as your only guide for what to study.

1. Find the exact value of each of the following.

   a. $\tan\left(\sin^{-1}\left(-\frac{99}{101}\right)\right)$

   b. $\cos^{-1}\left(\cos\left(\frac{4\pi}{3}\right)\right)$

2. Given triangle $\triangle ABC$ with the following properties:
   $b = 14,\ c = 17,\ B = 44°$ and C is an obtuse angle
   Find the measure of angle C.
   Round your answer to 2 decimal places.

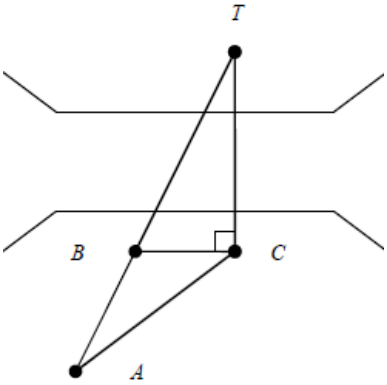


3. A team of surveyors have been hired to measure the distance across a canyon. Using a tree at point T on the opposite site of the canyon as a reference point, they established points A, B, and C and found the following distances:

   AB = 12.25 ft
   BC = 6.5 ft
   AC = 15 ft

   a. Find the measure of angle ABC.
   Round your answer to 2 decimal places.

   b. Find the distance TC across the canyon to the nearest foot.



4. Given $\cot x = -\frac{2}{3}$ and $\sin x > 0$ find:

   a. $\sin 2x$

   b. $\sin\frac{x}{2}$

   c. $\cos 2x$

   d. $\cos\frac{x}{2}$

5. Find the exact solution of:

a. $\sin\frac{11\pi}{12}$

b. $\tan(165°)$

c. $\cos\frac{7\pi}{8}$

6. Find all solutions of:

a. $\sqrt{2}\cos 2x+1=0$ on the interval $[0,2\pi)$

b. $\cos x\sin x-2\cos x=0$

c. $2\sin\frac{x}{2}-\sqrt{3}=0$ on the interval $[0,8\pi)$

7. Establish the identity:

a. $\frac{1-\sin x}{1+\sin x}=(\sec x-\tan x)^2$

b. $\frac{\sec\theta+\csc\theta}{\tan\theta+\cot\theta}=\sin\theta+\cos\theta$

c. $\cot(x+y)=\frac{\cot x\cot y-1}{\cot x+\cot y}$

d. $\sin\left(\frac{\pi}{2}-x\right)=\sin\left(\frac{\pi}{2}+x\right)$

e. $\frac{1+\sin 2x}{\sin 2x}=1+\frac{1}{2}\sec x\csc x$

ANSWERS

1. a. $-\frac{99}{20}$ b. $\frac{2\pi}{3}$

2. $C=122.49°$

3. a. $\angle ABC=101.84°$ b. $TC=31$ feet

4. a. $-\frac{12}{13}$ b. $\sqrt{\frac{1}{2}+\frac{1}{\sqrt{13}}}$ c. $-\frac{5}{13}$ d. $\sqrt{\frac{1}{2}-\frac{1}{\sqrt{13}}}$

5. a. $\frac{\sqrt{6}-\sqrt{2}}{4}$ b. $\frac{1-\sqrt{3}}{1+\sqrt{3}}$ c. $-\sqrt{\frac{2-\sqrt{2}}{4}}$

6. a. $\frac{3\pi}{8},\frac{5\pi}{8},\frac{11\pi}{8},\frac{13\pi}{8}$ b. $\frac{\pi}{2}+\pi k$ c. $\frac{2\pi}{3},\frac{4\pi}{3},\frac{14\pi}{3},\frac{16\pi}{3}$

7. a.

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

$$\frac{1-\sin x}{1+\sin x}\cdot\frac{1-\sin x}{1-\sin x}=RHS$$

$$\frac{1-2\sin x+\sin^2 x}{1-\sin^2 x}=RHS$$

$$\frac{1-2\sin x+\sin^2 x}{\cos^2 x}=RHS$$

$$\frac{1}{\cos^2 x}-\frac{2\sin x}{\cos^2 x}+\frac{\sin^2 x}{\cos^2 x}=RHS$$

$$\sec^2 x-2\sec x\tan x+\tan^2 x=(\sec x-\tan x)^2$$

b.

$$\frac{\sec x+\csc x}{\tan x+\cot x}=\sin x+\cos x$$

$$\frac{\frac{1}{\cos x}+\frac{1}{\sin x}}{\frac{\sin x}{\cos x}+\frac{\cos x}{\sin x}}=RHS$$

$$\frac{\frac{\sin x+\cos x}{\cos x\sin x}}{\frac{\sin^2 x+\cos^2 x}{\cos x\sin x}}=RHS$$

$$\frac{\sin x+\cos x}{\cos x\sin x}\cdot\frac{\cos x\sin x}{\sin^2 x+\cos^2 x}=\sin x+\cos x$$

$$\cot(x+y)=\frac{\cot x\cot y-1}{\cot x+\cot y}$$

$$\frac{\cos(x+y)}{\sin(x+y)}=RHS$$

$$\frac{\left(\cos x\cos y-\sin x\sin y\right)}{\left(\sin x\cos y+\cos x\sin y\right)}=RHS$$

$$\frac{\left(\cos x\cos y-\sin x\sin y\right)\frac{1}{\sin y\sin x}}{\left(\sin x\cos y+\cos x\sin y\right)\frac{1}{\sin y\sin x}}=RHS$$

c.

$$\frac{\frac{\cos x\cos y}{\sin x\sin y}-1}{\frac{\cos y}{\sin y}+\frac{\cos x}{\sin x}}=\frac{\cot x\cot y-1}{\cot x+\cot y}$$

d.

$$\sin\left(\frac{\pi}{2}-x\right)=\sin\left(\frac{\pi}{2}+x\right)$$

$$LHS=\sin\left(\frac{\pi}{2}\right)\cos\left(x\right)+\sin x\cos\left(\frac{\pi}{2}\right)$$

$$LHS=1\cdot\cos x+0$$

$$LHS=\cos x$$

$$\sin\left(\frac{\pi}{2}-x\right)=\cos x$$

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e.

$$\frac{1+\sin 2x}{\sin 2x}=1+\frac{1}{2}\sec x\csc x$$

$$\frac{\sin 2x}{\sin 2x}+\frac{1}{\sin 2x}=RHS$$

$$1+\frac{1}{2\sin x\cos x}=RHS$$

$$1+\frac{1}{2}\csc x\sec x=1+\frac{1}{2}\sec x\csc x$$