

**Beverly Hills High School -- FST Trigonometry -- Spring '16 -- Test #2 -- 80 points**

On this and all following exams, give neat and complete answers, those that clearly show your understanding of the problem and its solution. In other words, show all your work. Five points each unless stated.

1) Given that  $\cot \theta = -1/2$ , find  $\cos \theta$  and  $\csc \theta$ , where  $2\pi > \theta > 3\pi/2$ .

2) Show how we derived the identity  $\cot^2\theta + 1 = \csc^2\theta$ .

3) Derive an expression equivalent to  $\cos 3\theta$  involving only  $\cos \theta$  and powers of  $\cos \theta$ .

4) Using the sum formula for cosine, show how we arrived at the definition for  $\cos 2\theta = 1 - 2 \sin^2\theta$ .

5) Find the exact value of  $\cos \frac{13\pi}{12}$ .

6) Given that  $\sin x = \frac{2}{3}$  and  $\cos y = \frac{4}{5}$  with  $x$  and  $y$  in quadrant I, find  $\sin(x + y)$ .

Verify each identity. Seven points apiece for these.

7)  $\frac{\cot^2 t - 1}{1 + \cot^2 t} = 2\cos^2 t - 1$

8)  $\frac{\sin(x - y)}{\sin(x + y)} = \frac{\tan x - \tan y}{\tan x + \tan y}$

9)  $1 + \tan y \tan 2y = \sec 2y$

10)  $\sin^2 \frac{n}{2} = \frac{\tan n - \sin n}{2 \tan n}$

11) For seven points, derive an expression for  $\tan 2\theta$ .

Five points. Use the angle sum and difference formulas to give an exact value for each.

12)  $\cos 255^\circ$

13)  $\tan \pi/12$

14)  $\cos \theta = \frac{-4}{5}$  and  $90^\circ < \theta < 180^\circ$   
Find  $\sin \frac{\theta}{2}$

15) EXTRA CREDIT - Five points - Derive an expression for  $\sin 5\theta$  involving only  $\sin \theta$  and powers of  $\sin \theta$ .