

Math 112  
Third Hour Exam

1. Find the amplitude, period, phase shift, and sketch the graph of

$$y = -2\sin\left(2x + \frac{\pi}{3}\right)$$

2. Find all solutions.  $2\cos t + 1 = 0$

3. Find all solutions in the interval  $[0, 2\pi)$ .  $\sin^2\theta + \sin\theta - 6 = 0$

4. If  $\alpha$  and  $\beta$  are acute angles such that  $\cos \alpha = \frac{4}{5}$  and  $\tan \beta = \frac{8}{15}$ , find

a)  $\sin(\alpha + \beta)$

b)  $\cos(\alpha + \beta)$

c) The quadrant containing  $\alpha + \beta$ .

5. Express as a trigonometric function of one angle.

a)  $\cos 10^\circ \sin 5^\circ - \sin 10^\circ \cos 5^\circ$

b)  $\sin(-5) \cos 2 + \cos 5 \sin(-2)$

5. Assume  $\sin \theta = \frac{3}{5}$ .

a) Find  $\cos \theta$

b) Find  $\cot \theta$

7. Consider the function  $y = \cos x$  on the interval  $0 \leq x \leq 4\pi$ .

a) Find all values of  $x$  such that  $y < \frac{\sqrt{3}}{2}$ .

b) Find all values of  $x$  such that  $y > \frac{\sqrt{3}}{2}$ .

8. Verify the identity  $\tan^2\alpha - \sin^2\alpha = \tan^2\alpha \sin^2\alpha$ .

9. Verify the identity  $\sin(u+v)\sin(u-v) = \sin^2u - \sin^2v$ .

10. Verify the identity  $\sin^4t = \frac{3}{8} - \frac{1}{2}\cos 2t + \frac{1}{8}\cos 4t$ .