

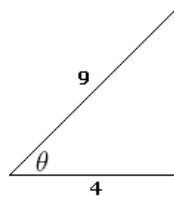
Mathematics 114 Spring 2007 – Review for Test 3

1. Convert $\frac{\pi}{12}$ and $\frac{2\pi}{3}$ to degrees, and convert 300° and 720° to radians.

2. Suppose $\sin \theta = \frac{1}{3}$. Find $\cot \theta$. (Assume $0 < \theta < 90^\circ$.)

3. For the triangle on the right, find

- (a) all six trigonometric functions for the angle θ
- (b) all six trigonometric functions for the angle 2θ .



4. Sketch the graphs of $f(x) = \sin x$ and $f(x) = \cos x$. Indicate the places where the curves cross the x -axis.

5. Find all the vertical asymptotes of $\tan x$.

6. Solve for x in the equation $\sin \theta = \frac{4}{x}$.

7. Find the following (no credit will be given for a calculator answer, you must give the *exact* answer).

- (a) $\sin \frac{2\pi}{3}$
- (b) $\sin 420^\circ$
- (c) $\cos 75^\circ$
- (d) $\cos (1110^\circ)$
- (e) $\tan \frac{\pi}{6}$

8. A 22-foot extension ladder leaning against a building makes a 70° angle with the ground. How far up the building does the ladder reach?

9. A tree which is 15 feet tall casts a 26 foot shadow. What is the angle of elevation of the sun?

10. Suppose you are standing 40 feet from a straight roadway and a car passes by you. Two seconds later you estimate the angle between yourself and the car is 55° . How fast is the car going?

11. Solve the following equations for x .

- (a) $\sin x = 0$
- (b) $\cos x = -1$
- (c) $\sin x \cos x + \sin x = 0$
- (d) $\sin x = -2$

12. Find all solutions in $[0, 2\pi)$ of the following. (Part (d) has 4 solutions.)

- (a) $\sin x = \frac{1}{2}$
- (b) $\tan x = -1$
- (c) $\sin 2x = 1$
- (d) $\sin 2x = \frac{\sqrt{3}}{2}$

13. Verify the following identities.

(a) $\frac{\tan x \cot x}{\cos x} = \sec x$

(b) $\sec^2 \theta + 7 = \tan^2 \theta + 8$

(c) $\cos^2 x - \sin^2 x = 2 \cos^2 x - 1$

(d) $\sec x \cos x - (\sin x \cot x)^2 = \sin^2 x$

(e) $\sin (7\pi - x) = \sin x$

(f) $\cos 3x = 4 \cos^3 x - 3 \cos x$

(g) $\frac{1}{\sin x} - \frac{\cos^2 x}{\sin x} = \sin x$

(h) $(\sec x - 1)(\sec x + 1) = \tan^2 x$

(i) $\csc 2\theta = \frac{1}{2} \sec \theta \csc \theta$

(j) $\frac{\cos(\alpha - \beta)}{\sin \alpha \cos \alpha}$