**Find the reference angle θR if θ has the given measure.**

1. (a) 240° (b) 340° (c) -202° (d) -660°

2. (a) 3π/4 (b) 4π/3 (c) -π/6 (d) 9π/4

3. (a) 3 (b) -2 (c) 5.5 (d) 100

**Find the exact value.**

4. (a) sin (2π/3) (b) sin (-5π/4) 5. (a) cos 150° (b) cos (-60°)

6. (a) tan (5π/6) (b) tan (-π/3) 7. (a) cot 120° (b) cot (-150°)

8. (a) sec (2π/3) (b) sec (-π/6) 9. (a) csc 240° (b) csc (-330°)

**Approximate to three decimal places.**

10. (a) sin 73°20' (b) cos 0.68 11. (a) tan 21°10' (b) cot 1.13

12. (a) sec 67°50' (b) csc 0.32 13. (a) csc 43°40' (b) sec 0.26

**Approximate the acute angle θ to the nearest (a) 0.01° and (b) 1'.**

14. cos θ = 0.8620 15. tan θ = 3.7 16. sin θ = 0.4217 17. sec θ = 4.246

**Approximate to four decimal places.**

18. (a) sin 98°10' (b) cos 623.7° (c) tan 3 (d) cot 231°40' (e) sec 1175.1° (f) csc 0.82

**Approximate, to the nearest 0.1°, all angles θ in the interval [0°, 360°) that satisfy the equation.**

19. (a) sin θ = -0.5640 (b) cos θ = 0.7490 (c) tan θ = 2.798

(d) cot θ = -0.9601 (e) sec θ = -1.116 (f) csc θ = 1.485

**Approximate, to the nearest 0.01 radian, all angles θ in the interval [0, 2π) that satisfy the equation.**

20. (a) sin θ = 0.4195 (b) cos θ = -0.1207 (c) tan θ = -3.2504

(d) cot θ = 2.6815 (e) sec θ = 1.7452 (f) csc θ = -4.8521

21. Suppose a robot has a straight arm 18 inches long that can rotate about the origin in a coordinate plane. If the robot's hand is located at (18,0) and then rotates through an angle of 60°, what is the new location of the hand?

22. Suppose the robots arm in #21 can change its length in addition to rotating about the origin. If the hand is initially at (12, 12), approximately how many degrees should the arm be rotated and how much should its length be changed to move the hand to (-16, 10)?