

Instructions: Show all work. Use exact answers unless specifically asked to round.

1. Find the values of the missing sides and angles for each described triangle(s). Round the angles to one decimal place (in degrees) and the sides to two decimal places, if needed.

a.  $a = 4, b = 6, C = 75^\circ$

$$c^2 = 4^2 + 6^2 - 2 \cdot 4 \cdot 6 \cos 75^\circ$$

$$c = 6.29$$



$$\frac{\sin B}{6} = \frac{\sin 75^\circ}{6.29} \Rightarrow B = 67.1^\circ$$

$$180 - 75 - 67.1 = 37.9^\circ = A$$

b.  $b = 7, c = 11, B = 35^\circ$

$$\frac{\sin 35^\circ}{7} = \frac{\sin C}{11} \Rightarrow C = 64.3^\circ$$

$$180 - 35 - 64.3 = 80.7^\circ = A$$

$$\frac{\sin 80.7^\circ}{a} = \frac{\sin 35^\circ}{7} \Rightarrow a = 12.04$$

2 triangles

or  $C = 115.7^\circ$   $+35 < 180^\circ$

$$180 - 35 - 115.7 = 29.3^\circ$$

$$\frac{\sin 29.3^\circ}{a} = \frac{\sin 35^\circ}{7} \Rightarrow a = 5.97$$

c.  $a = 10, b = 22, c = 30$

$$30^2 = 10^2 + 22^2 - 2 \cdot 10 \cdot 22 \cos C \Rightarrow C = 135.9^\circ$$

$$\frac{\sin 135.9^\circ}{30} = \frac{\sin B}{22} \Rightarrow B = 30.7^\circ$$

$$180 - 135.9 - 30.7 = 13.4^\circ = A$$

2. Convert the points in the first column from rectangular coordinates to polar coordinates, and the second column from polar to rectangular. Use exact values when working with a special angle, otherwise, round to two decimal places for  $x$ ,  $y$ , and  $r$ , and 4 decimal places for the angle (in radians!).

a.  $(1, \sqrt{3})$   $r = 2, \theta = \frac{\pi}{3}$   
 $(2, \frac{\pi}{3})$

d.  $(4, \frac{\pi}{4})$   $x = 4 \cos \frac{\pi}{4} = 4 \cdot \frac{\sqrt{2}}{2} = 2\sqrt{2}$   
 $y = 4 \sin \frac{\pi}{4} = 2\sqrt{2}$   
 $(2\sqrt{2}, 2\sqrt{2})$

b.  $(-3, 5)$   $r = \sqrt{34} \approx 5.83$   
 $\tan^{-1}(\frac{5}{-3}) + \pi = 2.1112$   
 $(5.83, 2.1112)$

e.  $(-3, -\frac{\pi}{5})$   $x = -3 \cos(-\frac{\pi}{5}) \approx -6.75$   
 $y = -3 \sin(-\frac{\pi}{5}) \approx 1.76$   
 $(-6.75, 1.76)$

c.  $(1, -7)$   $r = \sqrt{50} = 5\sqrt{2} \approx 7.07$   
 $\tan^{-1}(\frac{-7}{1}) = -1.4289$   
 $(7.07, -1.4289)$

f.  $(2, \frac{6\pi}{7})$   $x = 2 \cos \frac{6\pi}{7} \approx -1.80$   
 $y = 2 \sin \frac{6\pi}{7} \approx 0.87$   
 $(-1.80, 0.87)$