e) $\tan\theta = \frac{y}{x} = \frac{-1}{-1}$, so $x = -1$ and $y = -1$ for an angle in quadrant III.

Use the Pythagorean Theorem to determine r.

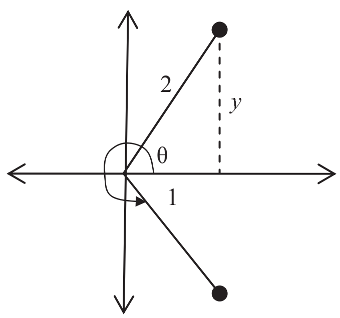
$r^2 = x^2 + y^2$
$r^2 = (-1)^2 + (-1)^2$
$r = \sqrt{2}$

Then, $\sin\theta = \frac{y}{r}$ and $\cos\theta = \frac{x}{r}$

$\sin\theta = \frac{-1}{\sqrt{2}}$ or $-\frac{\sqrt{2}}{2}$ $\qquad$ $\cos\theta = \frac{-1}{\sqrt{2}}$ or $-\frac{\sqrt{2}}{2}$

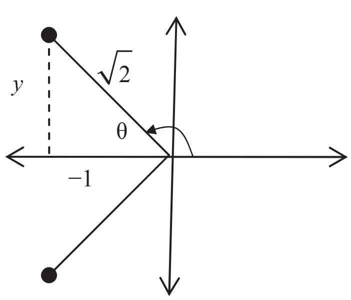
Section 2.2 Page 97 Question 9

a) The diagram shows the two possible positions of θ, $0° \leq \theta < 360°$, for which $\cos\theta = \frac{1}{2}$.



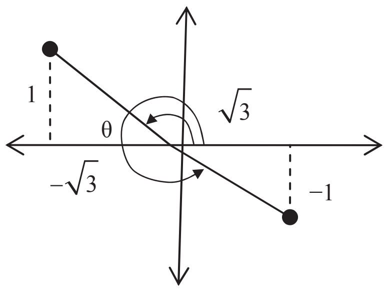
$\cos\theta = \frac{1}{2}$ is part of the 30°-60°-90° right triangle with sides 1, 2, and $\sqrt{3}$.
The reference angle for θ is 60°.
In quadrant I, $\theta = 60°$.
In quadrant IV, $\theta = 360° - 60°$ or 300°.

b) The diagram shows the two possible positions of θ, $0° \leq \theta < 360°$, for which $\cos\theta = -\frac{1}{\sqrt{2}}$.



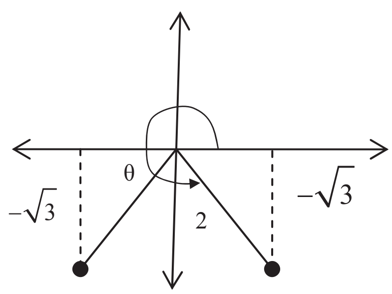
For $\cos\theta = -\frac{1}{\sqrt{2}}$, refer to the 45°-45°-90° right triangle with sides 1, 1, and $\sqrt{2}$.
The reference angle for θ is 45°.
In quadrant II, $\theta = 180° - 45°$ or 135°.
In quadrant III, $\theta = 180° + 45°$ or 225°.

c) The diagram shows the two possible positions of θ, $0° \le \theta < 360°$, for which $\tan\theta = -\frac{1}{\sqrt{3}}$.



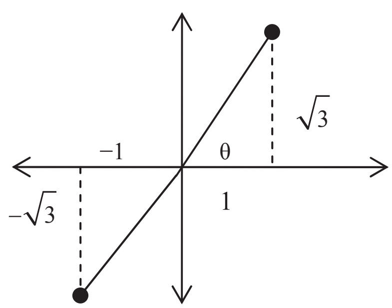
For $\tan\theta = -\frac{1}{\sqrt{3}}$, refer to the 30°-60°-90° right triangle with sides 1, 2, and $\sqrt{3}$.
The reference angle for θ is 30°.
In quadrant II, $\theta = 180° - 30°$ or 150°.
In quadrant IV, $\theta = 360° - 30°$ or 330°.

d) The diagram shows the two possible positions of θ, $0° \le \theta < 360°$, for which $\sin\theta = -\frac{\sqrt{3}}{2}$.



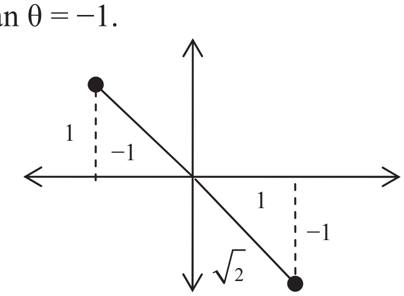
For $\sin\theta = -\frac{\sqrt{3}}{2}$, refer to the 30°-60°-90° right triangle with sides 1, 2, and $\sqrt{3}$.
The reference angle for θ is 60°.
In quadrant III, $\theta = 180° + 60°$ or 240°. In quadrant IV, $\theta = 360° - 60°$ or 300°.

e) The diagram shows the two possible positions of θ, $0° \le \theta < 360°$, for which $\tan\theta = \sqrt{3}$.



For $\tan\theta = \sqrt{3}$, refer to the 30°-60°-90° right triangle with sides 1, 2, and $\sqrt{3}$.
The reference angle for θ is 60°.
In quadrant I, $\theta = 60°$.
In quadrant IV, $\theta = 180° + 60°$ or 240°.

f) The diagram shows the two possible positions of θ, $0° \le \theta < 360°$, for which $\tan\theta = -1$.



For $\tan\theta = -1$, refer to the 45°-45°-90° right triangle with sides 1, 1, and $\sqrt{2}$.
The reference angle for θ is 45°.
In quadrant II, $\theta = 180° - 45°$ or 135°.
In quadrant IV, $\theta = 360° - 45°$ or 315°.

Section 2.2 Page 97 Question 10

θ	$\sin\theta$	$\cos\theta$	$\tan\theta$
0°	0	1	0
90°	1	0	undefined
180°	0	−1	0
270°	−1	0	undefined
360°	0	1	0

Section 2.2 Page 97 Question 11

a) Given P(−8, 6), use $x = -8$, $y = 6$, and the Pythagorean Theorem to determine r.

$r^2 = x^2 + y^2$
$r^2 = (-8)^2 + 6^2$
$r^2 = 64 + 36$
$r^2 = 100$
$r = 10$

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$

$\sin\theta = \frac{6}{10}$ or $\frac{3}{5}$ $\cos\theta = \frac{-8}{10}$ or $-\frac{4}{5}$ $\tan\theta = \frac{6}{-8}$ or $-\frac{3}{4}$

b) Given P(5, −12), use $x = 5$, $y = -12$, and the Pythagorean Theorem to determine r.

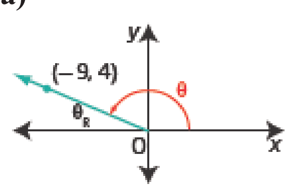
$r^2 = x^2 + y^2$
$r^2 = 5^2 + (-12)^2$
$r^2 = 25 + 144$
$r^2 = 169$
$r = 13$

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$

$\sin\theta = \frac{-12}{13}$ $\cos\theta = \frac{5}{13}$ $\tan\theta = \frac{-12}{5}$

Section 2.2 Page 97 Question 12

a)



b) $\tan\theta_R = \dfrac{4}{9}$

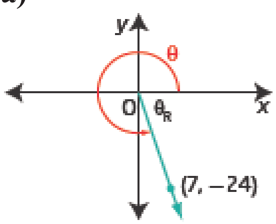
$\theta_R = \tan^{-1}\left(\dfrac{4}{9}\right)$

$\theta_R \approx 24°$

c) $\theta = 180° - 24°$
$\theta = 156°$, to the nearest degree

Section 2.2 Page 97 Question 13

a)



b) $\tan\theta_R = \dfrac{24}{7}$

$\theta_R = \tan^{-1}\left(\dfrac{24}{7}\right)$

$\theta_R \approx 74°$

c) $\theta = 360° - 74°$
$\theta = 286°$, to the nearest degree

Section 2.2 Page 97 Question 14

a) Given P(2, 4), then $x = 2$ and $y = 4$. Use the Pythagorean Theorem to determine r.

$r^2 = x^2 + y^2$
$r^2 = 2^2 + 4^2$
$r^2 = 20$
$r = \sqrt{20}$

Then, $\sin\theta = \dfrac{y}{r}$

$\sin\theta = \dfrac{4}{\sqrt{20}} = \dfrac{4}{2\sqrt{5}}$ or $\dfrac{2\sqrt{5}}{5}$

b) Given Q(4, 8), then $x = 4$ and $y = 8$.

Then, $r^2 = x^2 + y^2$
$r^2 = 4^2 + 8^2$
$r^2 = 80$
$r = \sqrt{80}$

$\sin\theta = \dfrac{y}{r}$

$\sin\theta = \dfrac{8}{\sqrt{80}} = \dfrac{8}{4\sqrt{5}}$ or $\dfrac{2\sqrt{5}}{5}$

c) Given R(8, 16), then $x = 8$ and $y = 16$.

Then, $r^2 = x^2 + y^2$
$r^2 = 8^2 + 16^2$