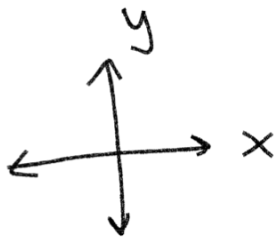
M-CT Calc 3 Trig 4/18

Rectangular coordinates (x, y)

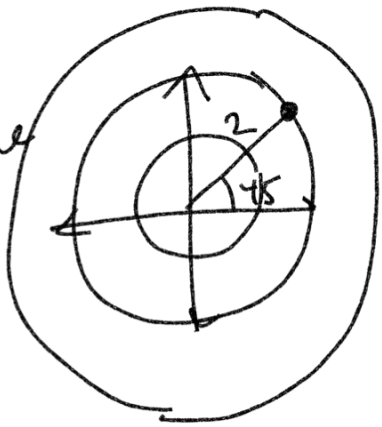


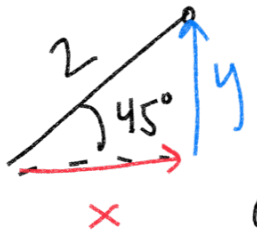
Polar Coordinate (r, θ)

radius, angle

$2, 45°$

$(2, 45°)$





(x, y)

$\cos 45° = \frac{adj}{hyp}$

$2(\cos 45°) = \left(\frac{x}{2}\right)2$

$2\cos 45° = x$

$2\left(\frac{\sqrt{2}}{2}\right) = x$

$\boxed{\sqrt{2} = x}$

$2(\sin 45°) = \left(\frac{y}{2}\right)2$

$y = 2\sin 45°$

$y = 2\left(\frac{\sqrt{2}}{2}\right)$

$\boxed{y = \sqrt{2}}$

$y = r\sin\theta$

$x = r\cos\theta$

Polar $\longrightarrow$ Rectangular

$(2, 45°) \longrightarrow (\sqrt{2}, \sqrt{2})$

$(r, \theta) = (3, 120^\circ) \longrightarrow (x, y)$

$\frac{2\pi}{3}$

$x = r\cos\theta$

$3\cos 120^\circ$

$3\left(-\frac{1}{2}\right)$

$-\frac{3}{2}$

$y = r\sin\theta$

$3\sin 120$

$3\left(\frac{\sqrt{3}}{2}\right)$

$\frac{3\sqrt{3}}{2}$

$\left(-\frac{3}{2}, \frac{3\sqrt{3}}{2}\right)$

$(r, \theta) = \left(\frac{2}{7}, 210^\circ\right)$ or $\left(\frac{2}{7}, \frac{7\pi}{6}\right)$

$x = \frac{2}{7}\cos 210$

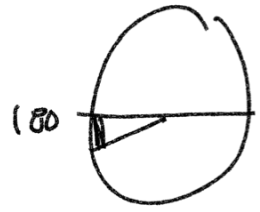
$\frac{2}{7}\left(\frac{-\sqrt{3}}{2}\right) =$

$\frac{-\sqrt{3}}{7}$

$y = \frac{2}{7}\sin 210$

$\left(\frac{2}{7}\right)\left(-\frac{1}{2}\right)$

$-\frac{1}{7}$



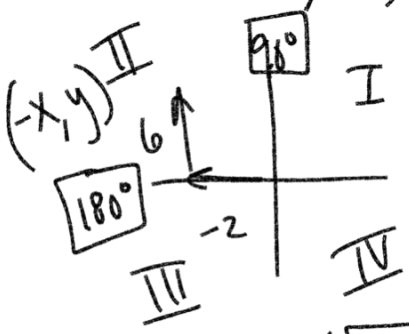
$\left(-\frac{\sqrt{3}}{7}, -\frac{1}{7}\right)$

Rectangular $\longrightarrow$ Polar

$(x, y) \longrightarrow (r, \theta)$

$r = \sqrt{x^2 + y^2}$ $\quad \theta = \tan^{-1}\frac{y}{x}$

$(-2, 6)$ $\quad r = \sqrt{(-2)^2 + (6)^2}$ $\quad \theta = \tan^{-1}\frac{6}{-2}$



$\sqrt{4+36}$

$\sqrt{40} = \sqrt{4}\sqrt{10}$

$2\sqrt{10}$

$\tan^{-1} -3$

180

-71.6

108.4

$(2\sqrt{10}, 108.4°)$

$(-4, -3)$ $\quad \theta = \tan^{-1}\frac{3}{4}$

$r = \sqrt{(-4)^2 + (-3)^2}$

$\sqrt{16+9} = \sqrt{25} = 5$

36.9

180

216.9

$(5, 216.9°)$