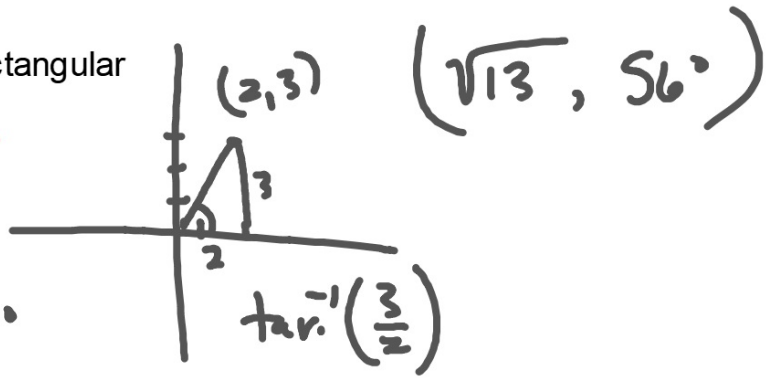
Trig 9.3

Convert between polar and rectangular coordinates

$\cos\theta = \frac{x}{h}$



rectangular coordinates

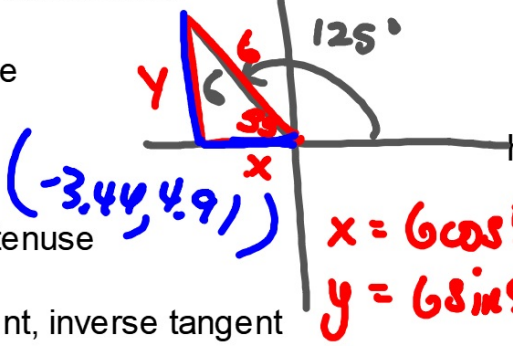
polar coordinates

cosine

sine

hypotenuse

tangent, inverse tangent



http://mathworld.wolfram.com/Rose.html

$x = 6\cos 55 = 3.44$

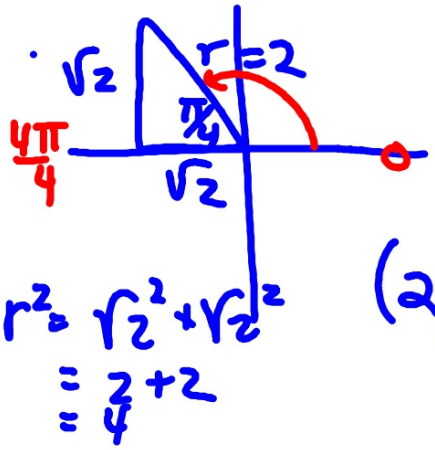
$y = 6\sin 55 = 4.91$

Whiteboards

$\tan^{-1}\left(\frac{\sqrt{2}}{\sqrt{2}}\right)$

Find the polar coordinates of each point with the given rectangular coordinates. Use $0 \le \theta < 2\pi$ and $r \ge 0$.

5. $\left(-\sqrt{2}, \sqrt{2}\right)$



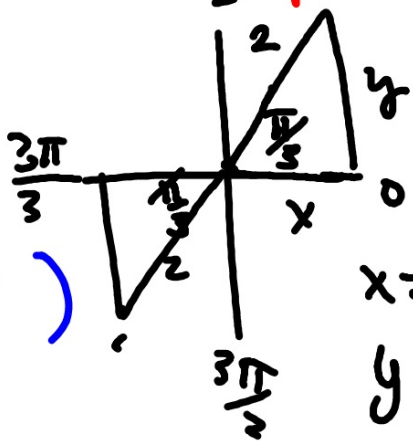
$r^2 = \sqrt{2}^2 + \sqrt{2}^2$

$= 2 + 2$

$= 4$

$\left(2, \frac{3\pi}{4}\right)$

6. $(-2, -5)$



$(1, \sqrt{3})$

$x = 2\cos\frac{\pi}{3} = 2 \cdot \frac{1}{2} = 1$

$y = 2\sin\frac{\pi}{3} = 2 \cdot \frac{\sqrt{3}}{2} = \sqrt{3}$

ps 7 ① $\left(-2, \frac{4\pi}{3}\right)$

Tiny little parking lot...

$y=r\sin\theta$

$x=r\cos\theta$

$x^2 + y^2 = r^2$

rectangular: x's y's polar: r's sin cos

tiny little parking lot

r θ

5 Write the rectangular equation $(x-3)^2+y^2=9$ in polar form.

$x^2-6x+9+y^2-9=0$

$x=r\cos\theta$

$y=r\sin\theta$

$x^2+y^2=r^2$

$x^2+y^2-6x=0$

$\frac{r^2}{r}-\frac{6r\cos\theta}{r}=\frac{0}{r}$

$r-6\cos\theta=0$

$r=6\cos\theta$

Write each rectangular equation in polar form.

9. $y = 2$

$\frac{r\sin\theta}{\sin\theta} = \frac{2}{\sin\theta}$

$r = \frac{2}{(\sin\theta)}$

$r = 2\csc\theta$

10. $x^2 + y^2 = 16$

$r^2 = 16$

$r = 4$

$r = -4$

$x = r\cos\theta$

$y = r\sin\theta$

$x^2 + y^2 = r^2$

Write each polar equation in rectangular form.

11. $r = 6$

12. $r = -\sec\theta$

sec=1/cos

$$r = \frac{-1}{\cos\theta}$$

$$\frac{r}{1} = \frac{-1}{\cos\theta}$$

$r\cos\theta = -1$

$x = -1$

$x = r\cos\theta$

$y = r\sin\theta$

$x^2 + y^2 = r^2$