§11.2 #s 4, 8, 17, 18, 22, 26, 32, 35*

#35 hearkens back to our formulation
for surface area of a solid of revolution
in C6.

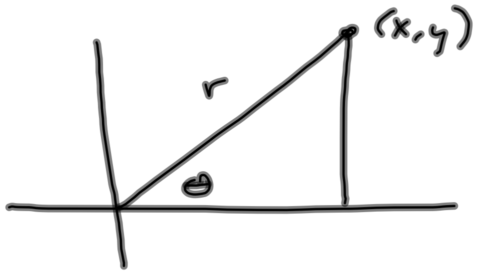
§11.3 #s 2, 6, 8, 14, 18, 26, 36, 40, 46, 66

§11.4 is where it gets tougher.

§11.3

Polar

$r = 1 + 2r\cos\theta$



$r = 1 + 2x$

$\sqrt{x^2+y^2} = 1 + 2x$

$x^2 + y^2 = 4x^2 + 4x + 1$

$y^2 - 3x^2 - 4x - 1 = 0$

$x = r\cos\theta$

$y = r\sin\theta$

$\tan\theta = \frac{y}{x}$

11.4 what in the WORLD does $\frac{dy}{dx}$ look like?

$$\frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}} = \frac{r\cos\theta}{-r\sin\theta} = -\cot\theta \; !?$$

only if $r =$ constant, and then we're going in circles

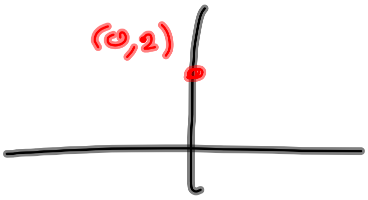
Not quite. Assume $r = f(\theta)$

This gives $$\frac{\frac{dr}{d\theta}\sin\theta + r\cos\theta}{\frac{dr}{d\theta}\cos\theta - r\sin\theta}$$ is more like it.

#3 Find (x,y) & all polar coords for pt.

a $(r,\theta) = (2, \frac{\pi}{2})$

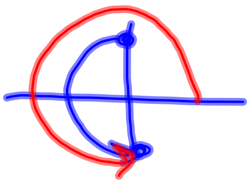
$\Rightarrow (x,y) = (0,2)$



$(r,\theta) = (2, \frac{\pi}{2} + 2n\pi),\ n \in \mathbb{Z}$

$(-2, \frac{3\pi}{2})$ or $\boxed{(-2, -\frac{\pi}{2}} + 2n\pi),\ n \in \mathbb{Z}$

$(-2, -\frac{\pi}{2})$ Book did: $(-2, \frac{\pi}{2} + (2n+1)\pi)$



$(-2, \pi + \frac{\pi}{2})$

$(-2, \pi + \frac{\pi}{2} + 2n\pi)$

$= (-2, (2n+1)\pi + \frac{\pi}{2})$ ok.

$(-2, \frac{3\pi}{2})$

$(-2, \frac{3\pi}{2} + 2n\pi)$

$= (-2, \frac{3\pi + 4n\pi}{2})$

$= (-2, \frac{(4n+3)\pi}{2})$

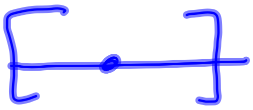
$r = 2$ circle of radius 2, centered @ $(0,0)$

$r \le 2$ Disk

$x + y + z = 1$

$x + y + z + w = 1$

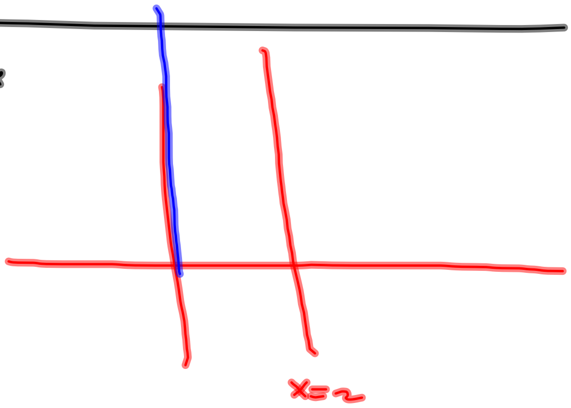
$0 \le r \le 2$



$r\cos\theta = 2$

$\to x = 2$ vertical line

$\to r = 2\sec\theta$



$$r\cos\theta + r\sin\theta = 1$$

$$x + y = 1$$

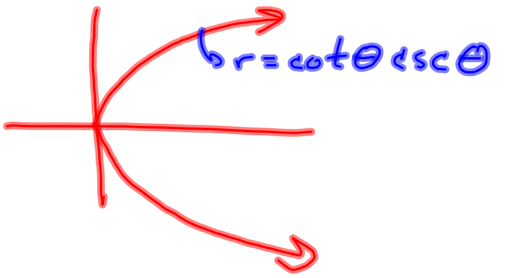
$$r = \cot\theta \csc\theta$$

$$r = \frac{\cos\theta}{\sin\theta} \cdot \frac{1}{\sin\theta} = \frac{r\cos\theta}{r\sin\theta} \cdot \frac{r}{r\sin\theta}$$

$$= \frac{x}{y} \cdot \frac{r}{y} = \frac{rx}{y^2} = r \longrightarrow$$

$$\frac{x}{y^2} = 1 \Longrightarrow$$

$$x = y^2$$



$$r = \frac{\cos\theta}{\sin\theta} \cdot \frac{1}{\sin\theta} = \frac{\frac{x}{r}}{\frac{y}{r}} \cdot \frac{1}{\frac{y}{r}} = \frac{xr}{y^2}$$

#'s 53-66

$x = 7$

$$\boxed{r\cos\theta = 7}$$

$r = 7\sec\theta$

$\frac{x^2}{9} + \frac{y^2}{4} = 1$

$4x^2 + 9y^2 = 36$

$$\boxed{4r^2\cos^2\theta + 9r^2\sin^2\theta = 36}$$

65

$$(x-3)^2+(y+1)^2=4$$

$$(r\cos\theta-3)^2+(r\sin\theta+1)^2=4$$

$$\underbrace{r^2\cos^2\theta-6r\cos\theta+9+r^2\sin^2\theta}+2r\sin\theta+1=4$$

$$r^2=6r\cos\theta-2r\sin\theta-6$$

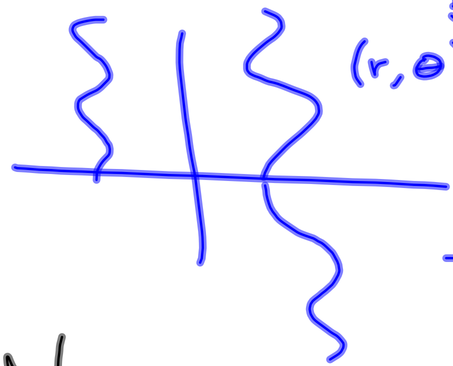
$\boxed{\text{Read §11.4}}$ Symmetry in 1^{st} page.

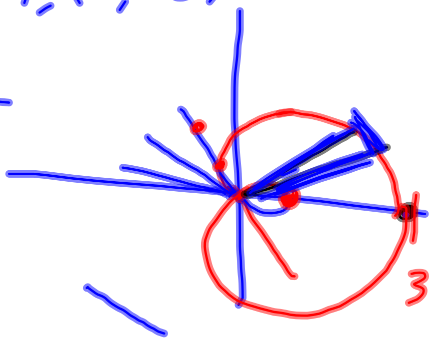
$$r^2(\cos^2\theta+\sin^2\theta)$$

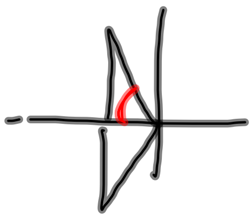
$= r^2$

$f(\theta)=r=1+2\cos\theta$

(r,θ), $(r,-\theta)$







πr^2
$= 2\pi \frac{r^2}{2}$

$1+2\cos\theta=0$

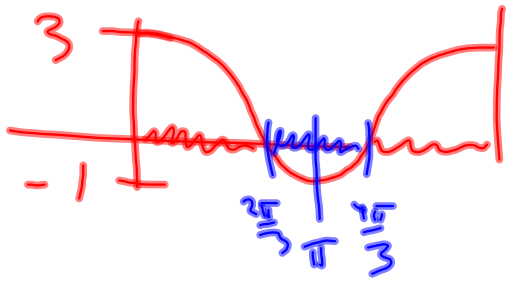
$2\cos\theta=-1$

$\cos\theta=-\frac{1}{2}$

$\frac{1}{2}r^2\theta$

$\frac{1}{2}r^2\,d\theta$

$2\cos\theta+1 = \theta\cdot\frac{r^2}{2}$



$\theta=\frac{2\pi}{3},\frac{4\pi}{3}$