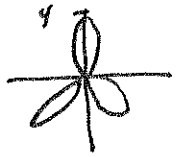
PreCalc BC Polar 'n' Parametric Review **Name:** Key

1. Sketch the following (check with calculator, *afterwards*).

a) $r = -4\sin(3\theta)$

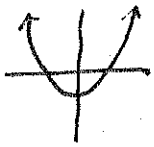


b) $r = \dfrac{4}{1-\sin\theta}$

$r - r\sin\theta = 4$

$r = y + 4$

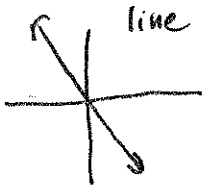
$r^2 = (y+4)^2$



parabola $x^2 + y^2 = y^2 + 8y + 16$

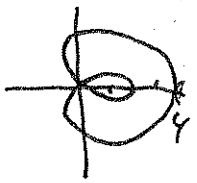
$y = \frac{1}{8}x^2 - 2$

c) $\theta = \dfrac{2\pi}{3}$



d) $r = 1 + 3\cos\theta$

limaçon

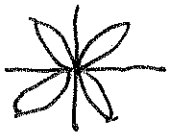


e)* $r = 8\sin\theta\cos\theta$

**think dbl angle formula*

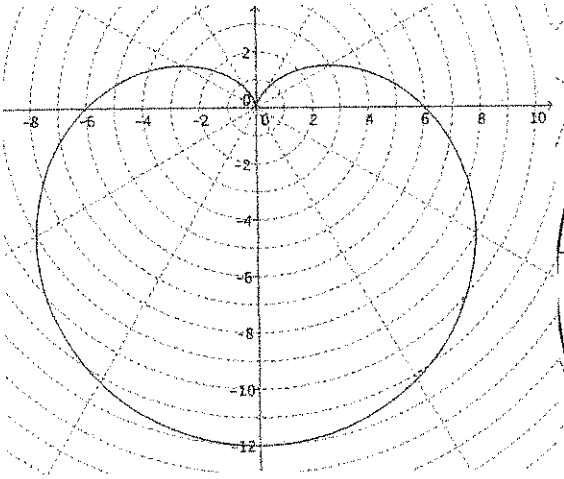
$r = 4(2\sin\theta\cos\theta)$

$r = 4\sin(2\theta)$ rose



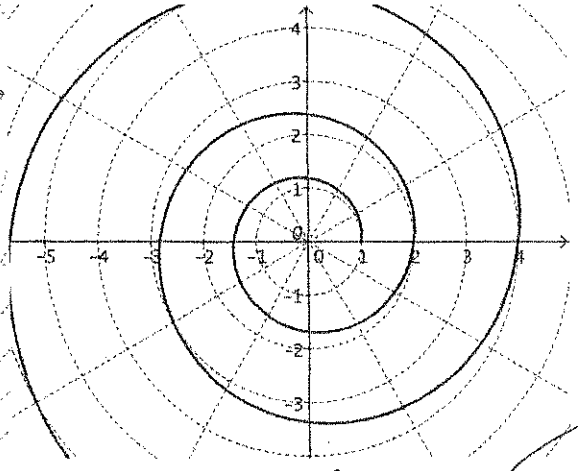
2. Write equations (*in polar form*):

a) *intcpts are integers*



$r = 6 - 6\sin\theta$

b) *x-intcpts are at 1, 2, 4, 8*



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

$2 = (k)^{2\pi}$

$\sqrt[2\pi]{2} = k$

c) In polar form: y = 3

$r\sin\theta = 3$

$r = 3\csc\theta$

d) In polar form: y = 1/x

$r\sin\theta = \dfrac{1}{r\cos\theta}$

e) An archimedian spiral passing through [1, π/3].

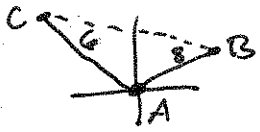
$r = \sqrt{\sec\theta \cdot \csc\theta}$

3. Find the perimeter of a triangle whose coordinates are

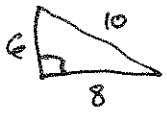
$A[0,0]$; $B\left[8,\frac{\pi}{3}\right]$; $C\left[6,\frac{5\pi}{6}\right]$

Use Law of Cosine

w/ $\theta = \frac{5\pi}{6} - \frac{\pi}{3}$



or observe:



$P = 24$

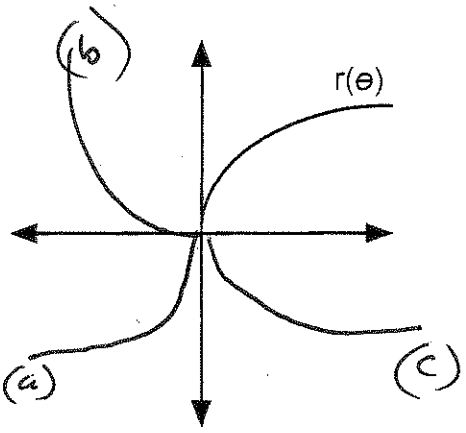
4. The graph of $r(\theta)$ is shown at right.

Sketch and label:

a) $-r(\theta)$

b) $r\left(\theta - \frac{\pi}{2}\right)$

c) $r(-\theta)$, *assuming* $r(-\theta) = r(\theta)$

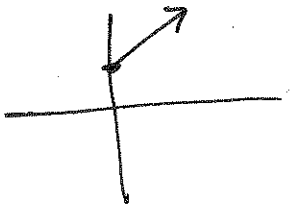


5. Eliminate the parameter and sketch the graphs below:

a) $\begin{cases} x(t) = t^2 \\ y(t) = t^2 + 1 \end{cases}$

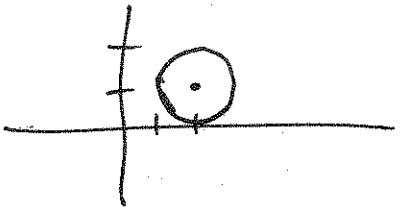
$y = x + 1$

$(x \geq 0)$

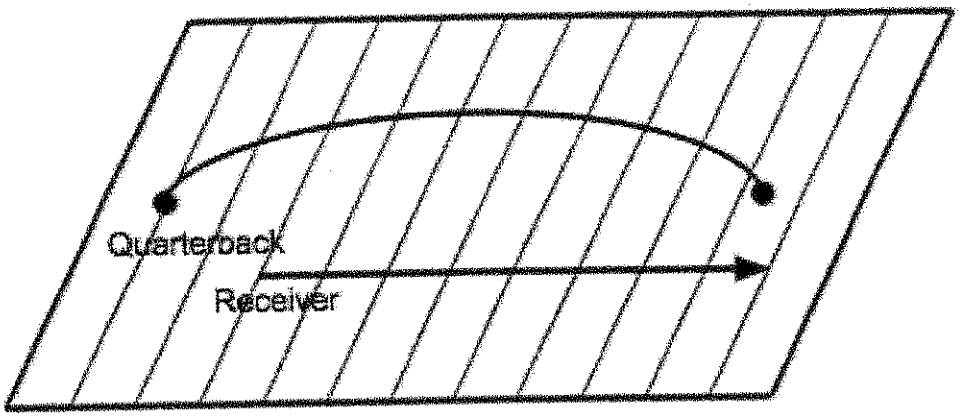


b) $\begin{cases} x(t) = 2 + \sin(t) \\ y(t) = 1 + \cos(t) \end{cases}$

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



6. A receiver on a football team, with a head start of 20 yards, runs downfield at a speed of 9 yd/sec. The quarterback throws a pass at an angle of 28° and a velocity of 23 yd/sec. Assume both players are 2 yards tall, and the term for displacement due to gravity is: $-5.3t^2$.



a) Set up a system of parametric equations:

receiver	football
$x(t) = 20 + 9t$	$x(t) = 23\cos(28^\circ)t$
$y(t) = 2$	$y(t) = -5.3t^2 + 23\sin(28^\circ)t + 2$

b) Find the distance between the ball and the receiver after 1.9 seconds.

SHOW WORK

$r(1.9) = (37.1, 2)$

$f(1.9) = (38.59, 3.38)$

$\sqrt{(37.1-38.59)^2 + (2-3.38)^2} = 2.03$ yd

7. A pebble becomes lodged in the tread of a 32" diameter tire rotating (along a road) at 3 revolutions per second. Write a system of parametric equations for the position of the pebble.

$x(t) = (16)(6\pi)t - 16\sin(6\pi t)$

$y(t) = 16 - 16\cos(6\pi t)$