Analysis H – Hahn / Tantod
Unit 2 – Polar and 3D graphing
Quiz on Polar Coordinates and Graphing
NO CALCULATORS

20
23 points

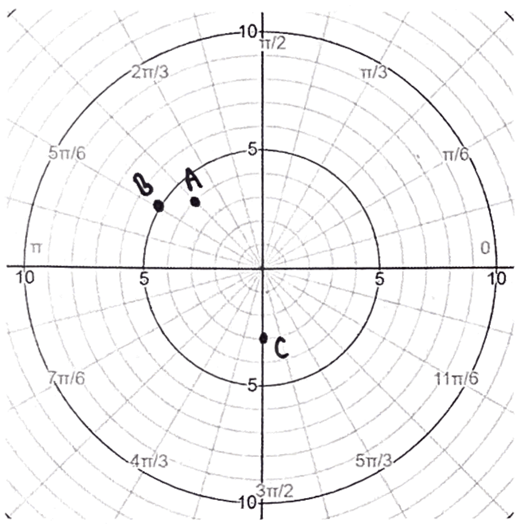
Polar vaulter: Chris Lee
Period: 3

1. Find the 14[th] term of the expansion of $(x-3y)^{41}$. [3 pts]
(leave your answer in choose notation and exponents – do NOT try to multiply it out, obvi.)

$\boxed{\binom{41}{13}\cancel{(x-3y)}}$ -2 $\binom{41}{13}x^{28}(-3y)^{13}$

$31 \div 4 = 7$ r 3, 28 $\frac{3\pi}{2}$

2. a) Use the polar axis below to graph and label the points $A(4, \frac{3\pi}{4})$, $B(-5, \frac{11\pi}{6})$, and $C(3, \frac{31\pi}{2})$ [1 pt each]



b) Convert the point $B(-5, \frac{11\pi}{6})$ to rectangular coordinates. [2 pts]

4, 5, x, $\frac{\pi}{6}$

$x = r\cos\theta$
$= 5 \cdot -\frac{\sqrt{3}}{2}$
$= \frac{-5\sqrt{3}}{2}$

$y = r\sin\theta$
$= 5 \cdot \frac{1}{2}$
$= \frac{5}{2}$

$\boxed{\left(-\frac{5\sqrt{3}}{2}, \frac{5}{2}\right)}$

c) The point $D(24, -24)$ is written in rectangular coordinates.
Convert the point to polar. [2 pts]

24, $\frac{\pi}{4}$, -24

24×24: 96, 48, 1056 (sic) ; $1056 + 1056 = 2112 = r^2$

$r = 24\sqrt{2}$

$\boxed{\left(24\sqrt{2}, \frac{7\pi}{4}\right)}$

3. Convert the equation $8 = r\sec\theta + 6\tan\theta$ to a rectangular form (hint: it makes a circle! Complete the squares to write the equation in its best form.) [4 pts]

$8 = \frac{r}{\cos\theta} + 6\frac{\sin\theta}{\cos\theta}$

$8 = \frac{r^2}{r\cos\theta} + 6\frac{r\sin\theta}{r\cos\theta}$

$8 = \frac{x^2+y^2}{x} + 6\frac{y}{x}$

$8x = x^2+y^2+6y$

$0 = x^2-8x+y^2+6y$

$25 = x^2-8x+16+y^2+6y+9$

$25 = (x-4)^2+(y+3)^2$

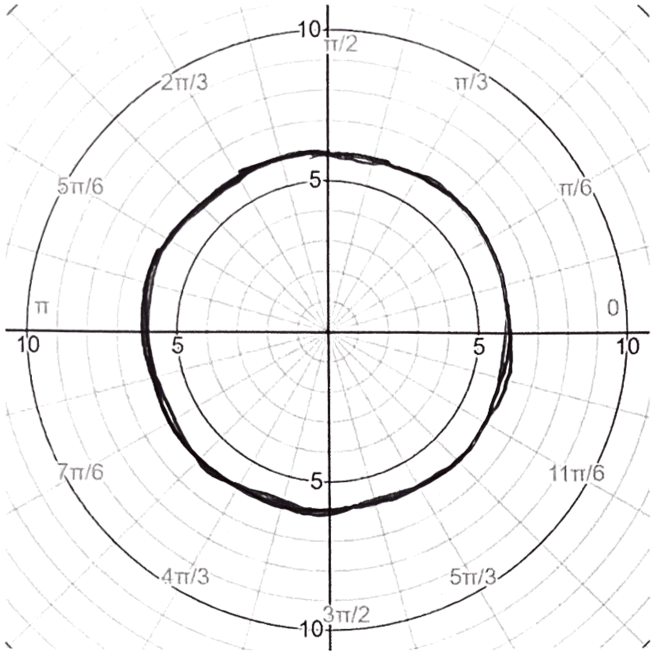
$\boxed{(x-4)^2+(y+3)^2 = 25}$

-2

19

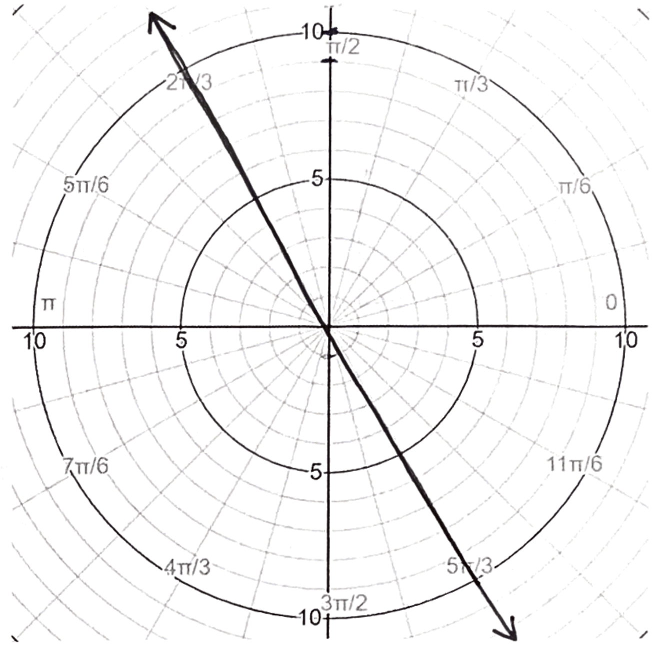
4. Graph each function. [2 pts each for a and b, 3 pts each for c and d]

a) $r = 6$



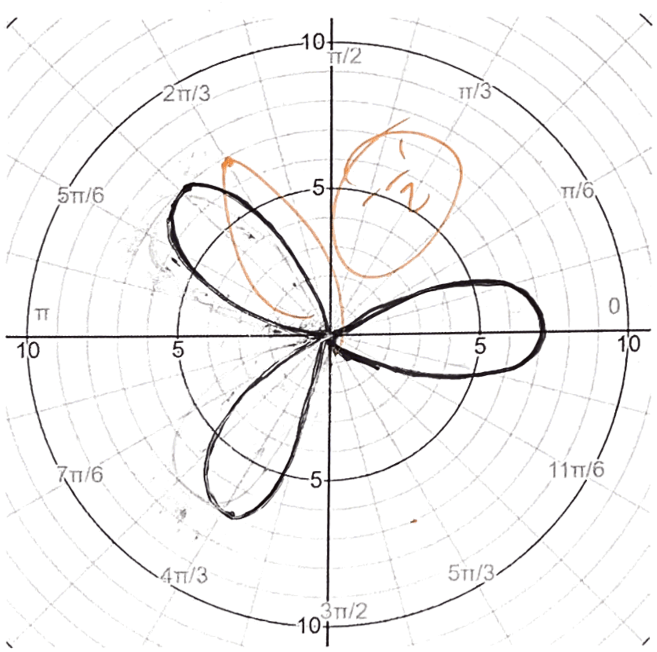
b) $\theta = \frac{2\pi}{3}$

19



loop, left, x-axis

c) $r = 7\cos(3\theta)$



d) $r = 5 - 7\cos\theta$

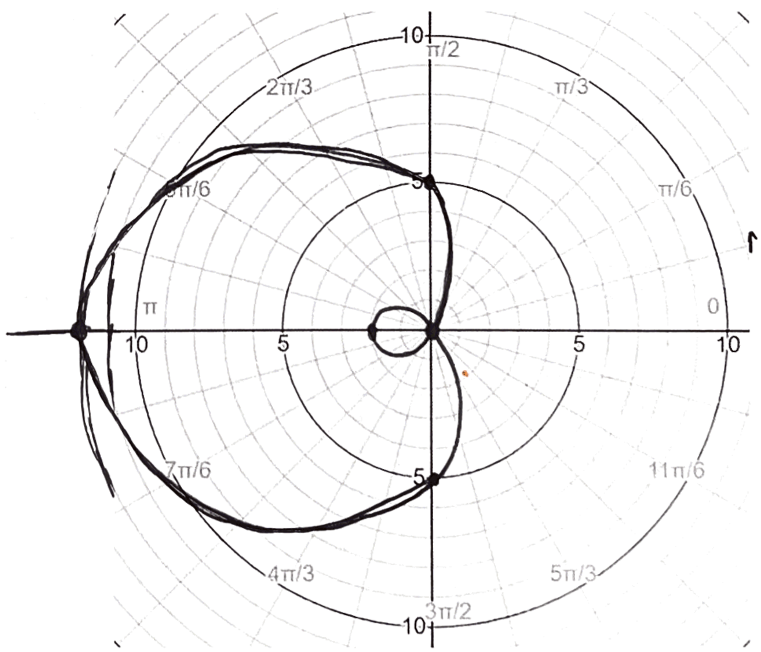
12

2

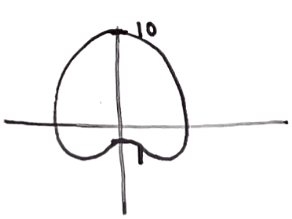
7

5

$r = 5 - 7\cos$



5. Write the equation of a dimpled limacon, where the maximum r-value is 10, the minimum r-value is 1, and the graph has symmetry about the line $\theta = \frac{\pi}{2}$ [1 pt]



$a + b = 10$

$a - b = 1$

9 1
8 2
7 3
6 4

$r = a + b\sin\theta$

$\boxed{r = 5 + 4\sin\theta}$

$-\frac{1}{2}$