

HW 10.3 #1-45 every other odd, 47-67 odd

Heather Graehl

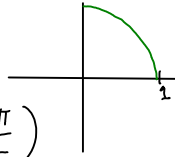
Tuesday, February 27, 2007

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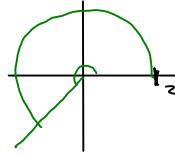
① a) $(1, \pi/2)$

other coords:

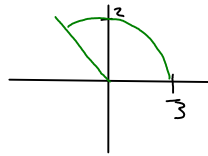
$(\frac{1}{2}, \frac{5\pi}{2}), (\frac{3}{2}, -\frac{5\pi}{2})$



⑥ $(-2, \pi/4)$



⑦ $(3, 2)$



⑤ a) $(1, 1)$

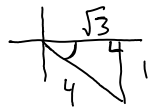
$r^2 = 1+1 \quad \tan \theta = 1$
 $r = \sqrt{2} \quad \frac{\pi}{4}$

i) $(\sqrt{2}, \frac{\pi}{4})$

ii) $(-\sqrt{2}, \frac{\pi}{4})$

⑥ $(2\sqrt{3}, -2)$

$r^2 = 4 \cdot 3 + 4$
 $= 4$

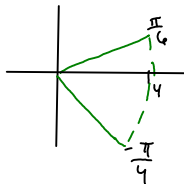


$\theta = -\frac{\pi}{6}$

ii) $(4, -\frac{\pi}{6})$

i) $(4, \frac{11\pi}{6})$

⑨ $0 \leq r < 4 \quad -\frac{\pi}{2} \leq \theta < \frac{\pi}{6}$



⑬ $(1, \frac{\pi}{6}) \quad (3, \frac{3\pi}{4})$

$x = \cos \frac{\pi}{6}$

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

$y = \frac{1}{2}$
 $(\frac{\sqrt{3}}{2}, \frac{1}{2})$



$\frac{1}{\sqrt{3}} \frac{1}{2}$

$\sqrt{2}$

$$\frac{3\pi}{4} \cdot \frac{180}{\pi} = 135$$

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

$$x = \cos \frac{3\pi}{4}$$

$$x = -\frac{\sqrt{2}}{2}$$



$$2\sqrt{2}$$

$$y = \sin \frac{3\pi}{4}$$

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

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

$$d = \sqrt{\left(-\frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{2}\right)^2 + \left(\frac{\sqrt{2}}{2} - \frac{1}{2}\right)^2}$$

$$= \sqrt{2.4747488 + .0428932}$$

$$= 1.5867$$

$$(17) r = 3 \sin \theta$$

$$y = r \sin \theta \quad \sin \theta = \frac{y}{r}$$

$$r = \frac{3y}{r}$$

$$3y = r^2 = x^2 + y^2$$

$$x^2 + y^2 - 3y = 0$$

$$\frac{3}{2} \cdot \frac{3}{2} = \frac{9}{4} \quad \left(y - \frac{3}{2}\right)^2 + x^2 = \frac{9}{4}$$

circle center $(0, \frac{3}{2})$ radius $\frac{3}{2}$

$$(21) x = 3$$

$$r \cos \theta = 3$$

$$r = \frac{3}{\cos \theta}$$

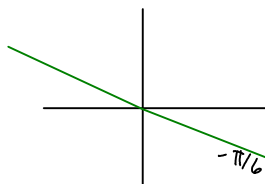
$$r = 3 \sec \theta$$

$$(25) x^2 + y^2 = 2cx$$

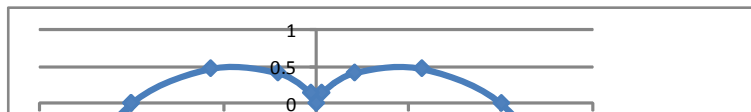
$$r^2 = 2c(r \cos \theta)$$

$$r = 2c \cos \theta$$

$$(29) \theta = -\frac{\pi}{6}$$

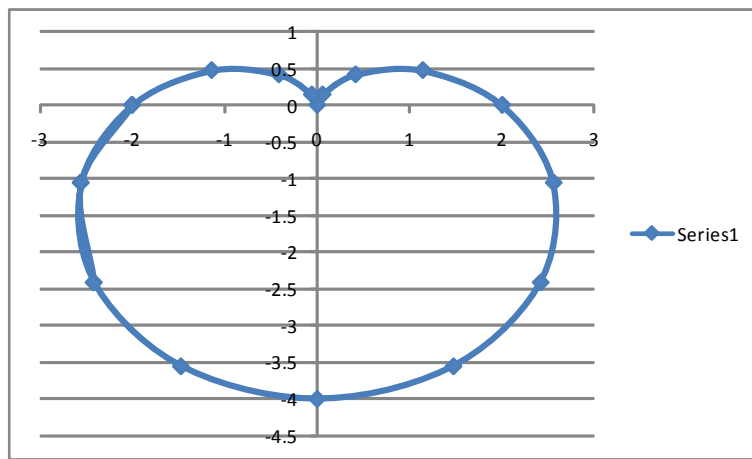


$$(33) r = 2(1 - \sin \theta)$$



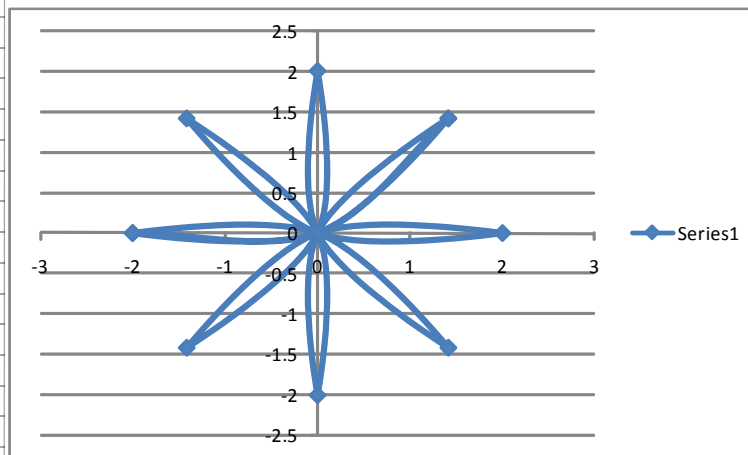
$$r = 2 - 2\sin\theta$$

theta	r	x	y
-3.14159	2.000005	-2.00001	-5.3E-06
-2.74889	2.765371	-2.55487	-1.05827
-2.35619	3.414216	-2.41421	-2.41422
-1.96349	3.84776	-1.47247	-3.55487
-1.5708	4	5.31E-06	-4
-1.1781	3.847758	1.472477	-3.55486
-0.7854	3.414213	2.414215	-2.41421
-0.3927	2.765366	2.554866	-1.05826
5.55E-16	2	2	1.11E-15
0.392699	1.234634	1.140653	0.472474
0.785398	0.585787	0.414215	0.414214
1.178096	0.152242	0.058261	0.140653
1.570795	1.76E-12	2.34E-18	1.76E-12
1.963494	0.15224	-0.05826	0.140651
2.356193	0.585784	-0.41421	0.414212
2.748891	1.234629	-1.14065	0.472475
3.14159	1.999995	-1.99999	5.31E-06
3.534289	2.765361	-2.55486	-1.05825
3.926988	3.414209	-2.41422	-2.4142



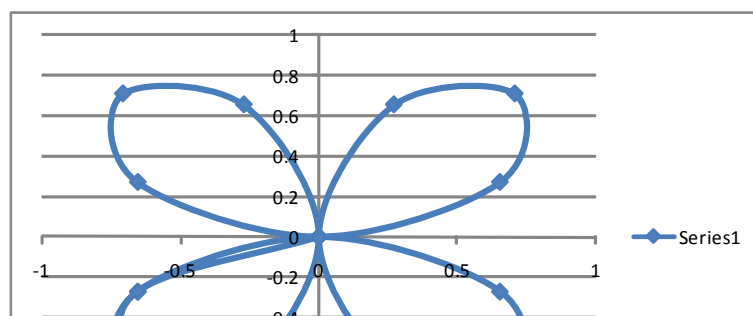
$$(39) \quad r = 2\cos^4\theta$$

theta	r	x	y
-3.14159	2	-2	-5.3E-06
-2.74889	-1.9E-05	1.72E-05	7.11E-06
-2.35619	-2	1.414211	1.414216
-1.96349	1.33E-05	-5.1E-06	-1.2E-05
-1.5708	2	2.65E-06	-2
-1.1781	-8E-06	-3E-06	7.35E-06
-0.7854	-2	-1.41421	1.414213
-0.3927	2.65E-06	2.45E-06	-1E-06
5.55E-16	2	2	1.11E-15
0.392699	2.65E-06	2.45E-06	1.02E-06
0.785398	-2	-1.41421	-1.41421
1.178096	-8E-06	-3E-06	-7.4E-06
1.570795	2	2.65E-06	2
1.963494	1.33E-05	-5.1E-06	1.23E-05
2.356193	-2	1.414211	-1.41422
2.748891	-1.9E-05	1.72E-05	-7.1E-06
3.14159	2	-2	5.31E-06
3.534289	2.39E-05	-2.2E-05	-9.1E-06
3.926988	-2	1.414218	1.414209



$$(37) \quad r = \sin 2\theta$$

theta	r	x	y
-3.14159	5.30718E-06	-5.3E-06	-1.4E-11
-2.74889	0.707110065	-0.65328	-0.2706
-2.35619	1	-0.70711	-0.70711
-1.96349	0.707104436	-0.2706	-0.65328
-1.5708	-2.6536E-06	-3.5E-12	2.65E-06



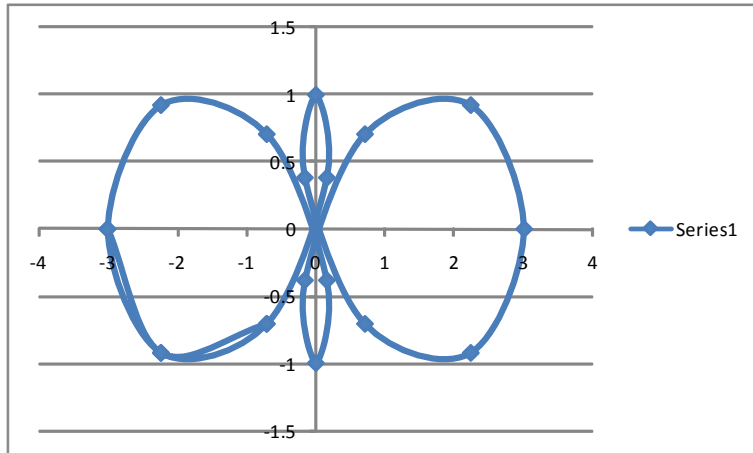
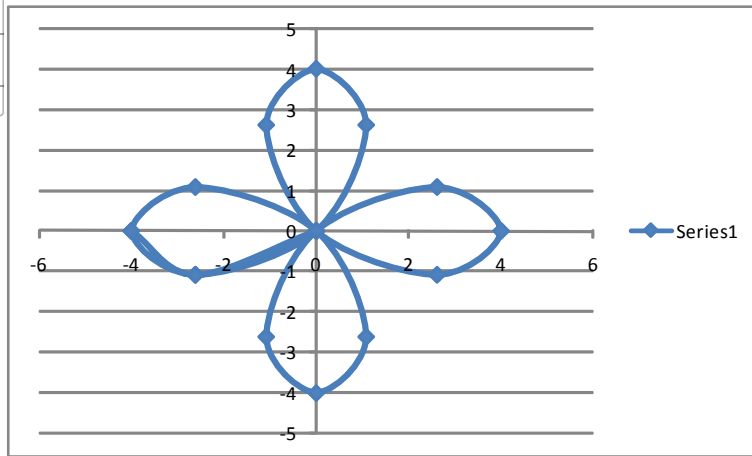
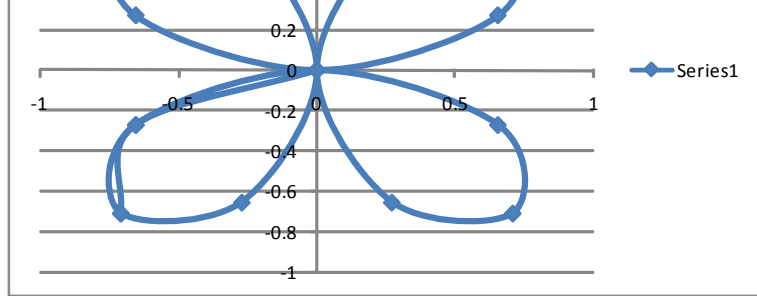
-1.1781	-0.70710819	-0.2706	0.653283
-0.7854	-1	-0.70711	0.707106
-0.3927	-0.70710631	-0.65328	0.270598
5.55E-16	1.11022E-15	1.11E-15	6.16E-31
0.392699	0.707106312	0.653281	0.270598
0.785398	1	0.707107	0.707106
1.178096	0.707108188	0.270599	0.653283
1.570795	2.65359E-06	3.52E-12	2.65E-06
1.963494	-0.707104	0.270596	-0.65328
2.356193	-1	0.707105	-0.70711
2.748891	-0.7071106	0.653284	-0.2706

41) $r^2 = 4 \cos 2\theta$

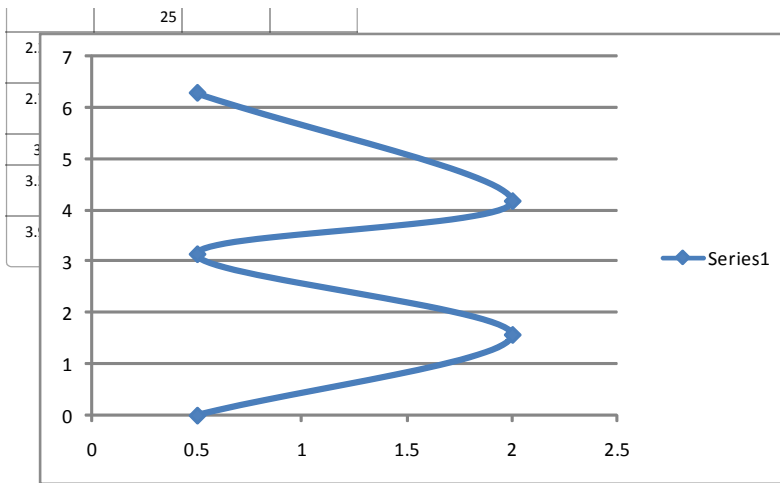
theta	3.14159	-5.3072E-06	5.31E-06	-1.4E-11
-3.14159	4	-4	-1.1E-05	
3.534289	0.7071025	-0.65328	-0.27059	
-2.74889	2.82841399	2.61311	-1.08239	
3.926988	1	-0.70711	-0.7071	
-2.35619	-1.5922E-05	1.13E-05	-1.13E-05	
-1.96349	-2.82843651	1.082391	2.613136	
-1.5708	-4	-5.3E-06	4	
-1.1781	-2.8284215	-1.08239	2.61312	
-0.7854	5.30718E-06	3.75E-06	-3.8E-06	
-0.3927	2.82842901	2.613128	-1.08239	
5.55E-16	4	4	2.22E-15	
0.392699	2.82842901	2.613128	1.082392	
0.785398	5.30718E-06	3.75E-06	3.75E-06	
1.178096	-2.8284215	-1.08239	-2.61312	
1.570795	-4	-5.3E-06	-4	
1.963494	-2.82843651	1.082391	-2.61314	
2.356193	-1.5922E-05	1.13E-05	-1.1E-05	
2.748891	2.82841399	-2.61311	1.082393	

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

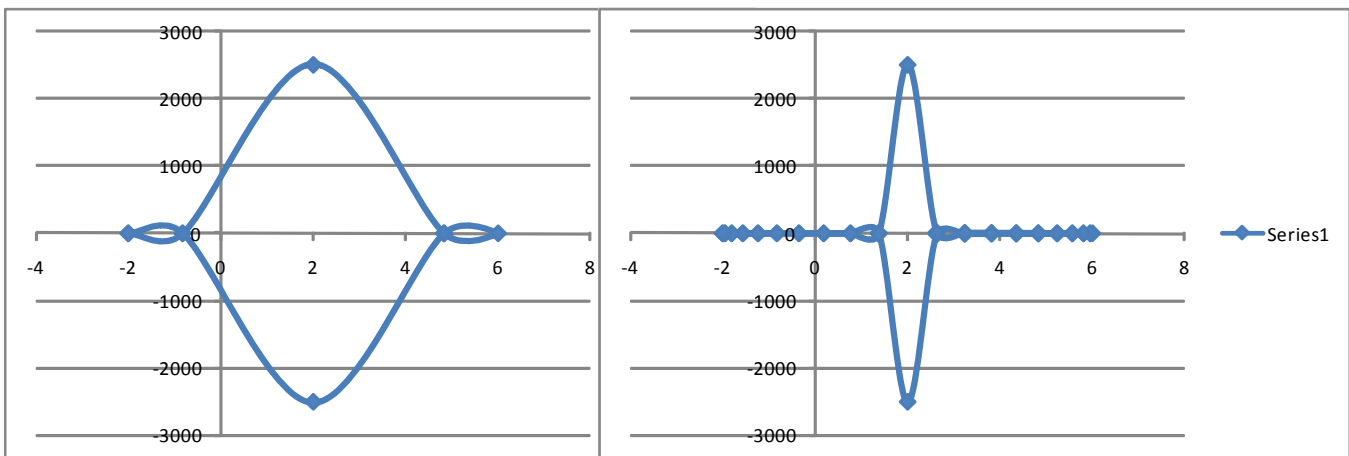
theta	3.14159	r	4	x	-4	1.06E-05
3.534289	2.8284440	3	2.61314	-3	-1.08239	-0.6
-2.74889	2.4142069	12	-2.23043	-0.92388		
3.926988	2.65359E-05	95	-1.9E-05	-1.9E-05		
-2.35619	0.999992039	05	-0.7071	-0.7071		
-1.96349	-0.41421825	0	0.158514	0.382688		
-1.5708	-1	-1	-1.3E-06	1		
-1.1781	-0.41421075	0	-0.15851	0.382681		
-0.7854	1.000002654	0	0.707109	-0.70711		
-0.3927	2.414214501	0	2.230444	-0.92388		
5.55E-16	3	3	3	1.67E-15		
0.392699	2.414214501	0	2.230444	0.923879		
0.785398	1.000002654	0	0.707109	0.707108		
1.178096	-0.41421075	0	-0.15851	-0.38268		
1.570795	-1	-1	-1.3E-06	-1		
1.963494	-0.414218	0	0.158514	-0.38269		



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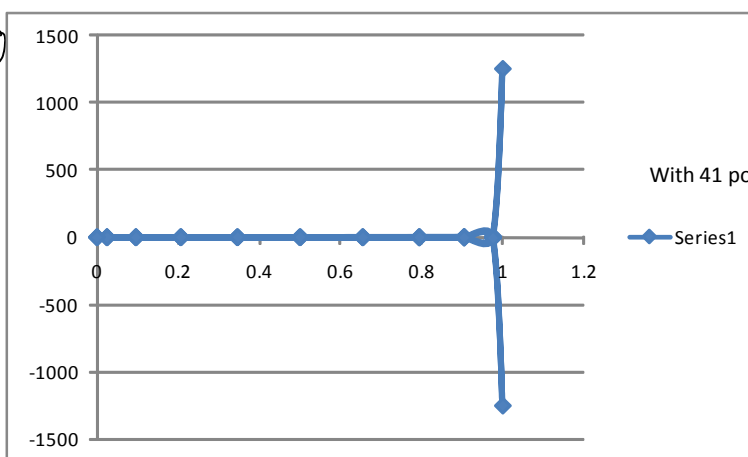
49 $r = 4 + 2\sec\theta$



With 10 points from $-\pi < \theta < \pi$

With 41 points from $-\pi < \theta < \pi$

51

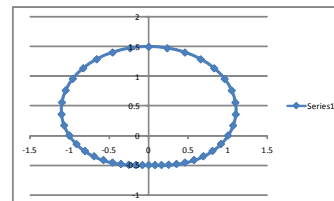
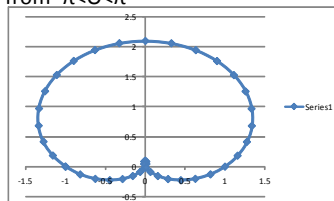
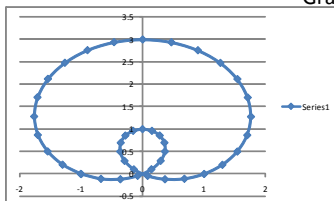


With 41 points from $-\pi < \theta < \pi$

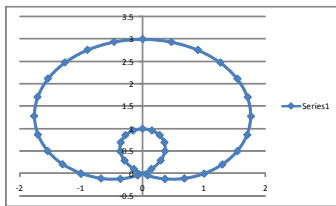
53

$r = 1 + \csc(\theta)$

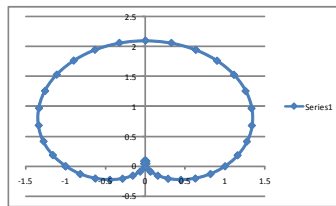
Graphs from $-\pi < \theta < \pi$



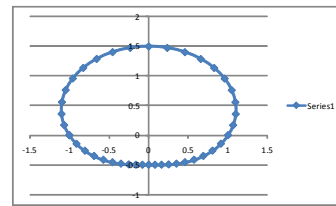
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C=2



C=1.1



C=1/2

(55) $r = 2\sin\theta$ $\theta = \frac{\pi}{6}$ $\frac{dr}{d\theta} = 2\cos\theta$

$$\frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}} = \frac{\frac{dr}{d\theta} \sin\theta + r\cos\theta}{\frac{dr}{d\theta} \cos\theta - r\sin\theta}$$

$$= \frac{2\cos\theta \sin\theta + 2\cos^2\theta}{2\cos^2\theta - 2\cos\theta \sin\theta}$$

$$\text{at } \frac{\pi}{6} = \frac{2.79133}{2\cos^2\theta - 2\cos\theta \sin\theta} = \frac{1.39566682955}{.75 - .43303}$$

$$= 4.403$$

(57) $r = \frac{1}{\theta}$, $\theta = \pi$ $\frac{dr}{d\theta} = -\theta^{-2}$

$$\frac{dy}{dx} = \frac{-\theta^{-2} \sin\theta + \theta^{-1} \cos\theta}{-\theta^{-2} \cos\theta - \theta^{-1} \sin\theta}$$

$$= \frac{-\theta^{-1} \sin\theta + \cos\theta}{-\theta^{-1} \cos\theta - \sin\theta}$$

$$\frac{1}{-\pi^{-1}} = -\pi$$

(59) $r = 1 + \cos\theta$ $\theta = \frac{\pi}{6}$ $\frac{dr}{d\theta} = -\sin\theta$

$$\frac{dy}{dx} = \frac{-\sin^2\theta + (1 + \cos\theta)(\cos\theta)}{-\sin\theta \cos\theta - (1 + \cos\theta)(\sin\theta)}$$

$$= \frac{-(\sqrt{2}/2)^2 + (1 + \sqrt{3}/2)(\sqrt{3}/2)}{-(\sqrt{2}/2)(\sqrt{3}/2) - (1 + \sqrt{3}/2)(\sqrt{2}/2)}$$

$$= \frac{-2 + \sqrt{3}/2 + 3/4}{-\sqrt{6}/4 - \sqrt{2}/2 + \sqrt{6}/4} = -.543$$

(61) $r = 3\cos\theta$

$$\frac{dr}{d\theta} = -3\sin\theta$$

horizontal $-3\sin^2\theta + 3\cos^2\theta = 0$

asymptotes $\cos^2\theta - \sin^2\theta = 0$

vertical asymptotes $-3\sin\theta\cos\theta - 3\cos\theta\sin\theta = 0$

⑥ $r = 1 + \cos\theta$

$$\frac{dr}{d\theta} = -\sin\theta$$

horizontal asymptotes $0 = -\sin^2\theta + (1 + \cos\theta)\cos\theta$

vertical asymptotes $0 = -\sin\theta\cos\theta - (1 + \cos\theta)(\sin\theta)$

⑦ $r = \cos 2\theta$

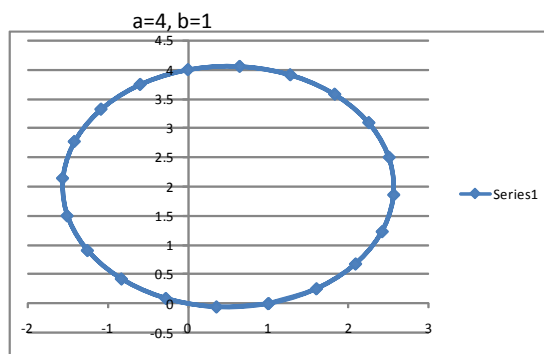
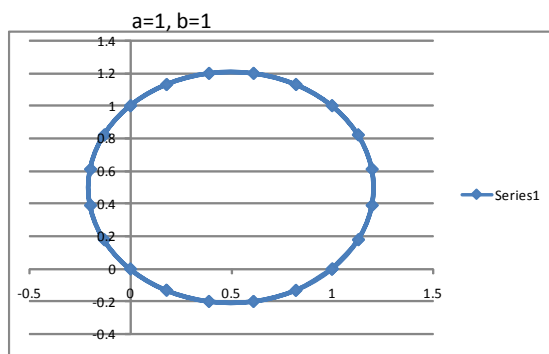
$$\frac{dr}{d\theta} = -2\sin 2\theta$$

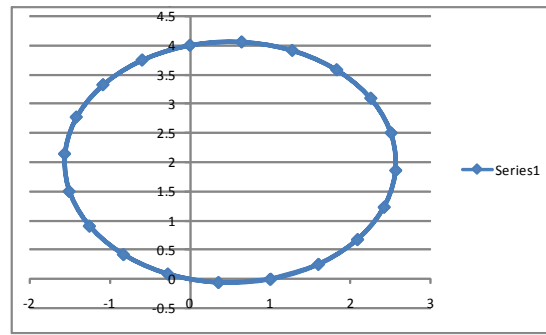
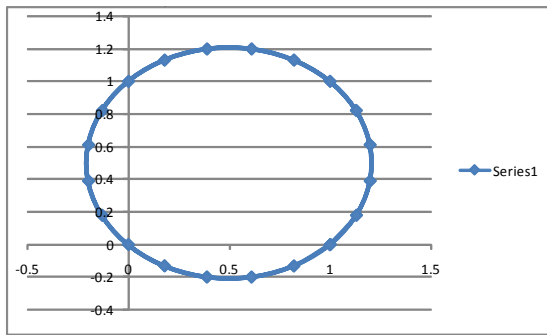
horizontal asymptotes $0 = (-2\sin 2\theta)(\sin\theta) + (\cos 2\theta)(\cos\theta)$

vertical asymptotes $0 = (-2\sin 2\theta)(\cos\theta) - (\cos 2\theta)(\sin\theta)$

⑧ $r = a\sin\theta + b\cos\theta$

From $-\pi < \theta < \pi$





a=1, b=4

