Math 49B
Quiz 5
Thu Feb 14, 2008 ♥

Code: _____
I forgot my code, so please charge me two points: (Name) _____

THIS IS A NO CALCULATOR QUIZ

[2 POINTS] How many loops/petals do the following rose-shaped curves have ?

(a) $r = \sin 7\theta$ — 7 (1)

(b) $r = \cos 6\theta$ — 12 (1)

[11 POINTS] Test the following graphs for symmetry. **SHOW YOUR WORK.**

(a) $r = \cos\theta + \sin\theta$; symmetry over the polar axis

① $-\theta$ FOR θ : $r = \cos(-\theta) + \sin(-\theta)$ (½)
$r = \cos\theta - \sin\theta$ (½) NO INFO (½)

② $-r$ FOR r : $-r = \cos(\pi-\theta) + \sin(\pi-\theta)$ (1)
$\pi-\theta$ FOR θ $-r = -\cos\theta + \sin\theta$
$r = \cos\theta - \sin\theta$ NO INFO (½)
(1)

(b) $r^2 = \cos 2\theta$; symmetry over $\theta = \frac{\pi}{2}$

$\pi-\theta$ FOR θ : $r^2 = \cos 2(\pi-\theta)$ (½)
$r^2 = \cos(2\pi-2\theta)$ (½)
$r^2 = \cos 2\theta$ SYMMETRIC (1)

OR

$-r$ FOR r : $(-r)^2 = \cos(-2\theta)$ (1)
$-\theta$ FOR θ $r^2 = \cos 2\theta$ SYMMETRIC (1)

(c) $r = \sec\theta$; symmetry through the pole

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

① $-r$ FOR r : $-r = \frac{1}{\cos\theta}$ (½)
$r = -\frac{1}{\cos\theta}$ (½) NO INFO

② $\pi+\theta$ FOR θ : $r = \frac{1}{\cos(\pi+\theta)}$ (½)
$r = -\frac{1}{\cos\theta}$ NO INFO
(1)

½ TOGETHER

[QUESTIONS ON OTHER SIDE]

[4 POINTS] For what value(s) of θ does the graph of $r = 1 + 2\cos 2\theta$ pass through the pole ?

$1 + 2\cos 2\theta = 0$

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

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

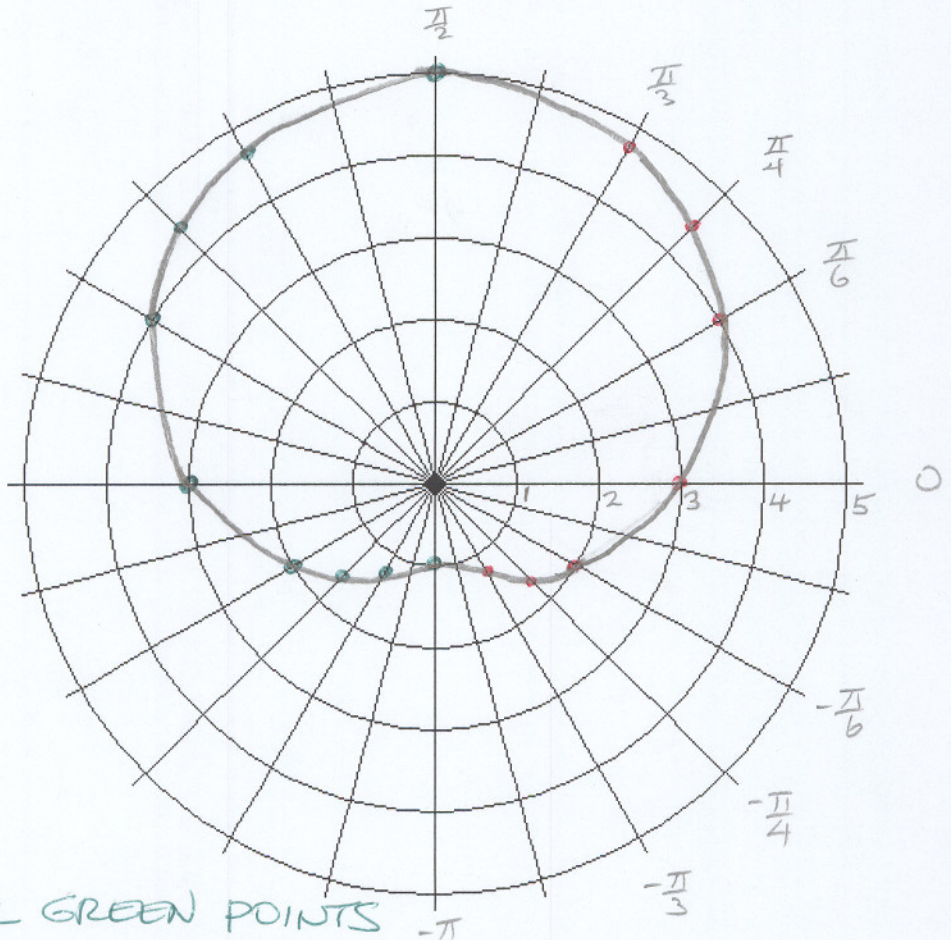
$\theta = \frac{\pi}{3} + n\pi, \frac{2\pi}{3} + n\pi$

$\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

$\frac{1}{2}$ POINT EACH

[4 POINTS] The following table gives the approximate values of r for various values of θ for the graph $r = 2\sin\theta - 3$. In addition, the graph is symmetric over $\theta = \frac{\pi}{2}$. Sketch the entire graph.

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
r	–5	–4.7	–4.4	–4	–3	–2	–1.6	–1.3	–1



2 POINTS FOR GREEN POINTS

1 POINT FOR REFLECTION OVER $\theta = \frac{\pi}{2}$

1 POINT FOR CORRECT SHAPE