Math 49B (8:30am – 9:20am)
Quiz 5 Version B
Fri Feb 11, 2011

PERSON #1 – Name you asked to be called in class: _____

PERSON #2 – Name you asked to be called in class: _____

SCORE: ___ / 30 POINTS

NO CALCULATORS ALLOWED

YOU MUST SHOW APPROPRIATE WORK TO RECEIVE FULL CREDIT

Use the power reducing formulae to rewrite $\sin^4 x$ in terms of the first powers of cosines. **SCORE: ___ / 3 POINTS**

$$\sin^4 x = (\sin^2 x)^2$$

$$= \tfrac{1}{2}\left(\frac{1-\cos 2x}{2}\right)^2$$

$$= \tfrac{1}{2}\left(\frac{1-2\cos 2x+\cos^2 2x}{4}\right)$$

$$= \tfrac{1}{2}\left(\frac{1-2\cos 2x+\frac{1+\cos 4x}{2}}{4}\right) = \left(\frac{3-4\cos 2x+\cos 4x}{8}\right)\tfrac{1}{2}$$

Graph the conic with polar equation $r = \dfrac{5}{2-3\cos\theta}$ by answering the following questions first. **SCORE: ___ / 11 POINTS**

You must use techniques discussed either in lecture or in the handouts.

[a] Determine the eccentricity and type of the conic.

$r = \dfrac{\frac{5}{2}}{1-\frac{3}{2}\cos\theta}$ $\quad e = \frac{3}{2} \Rightarrow$ HYPERBOLA

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

[b] Determine the equation of the directrix.

$ep = \frac{5}{2} \Rightarrow \frac{3}{2}p = \frac{5}{2} \Rightarrow p = \frac{5}{3}$

$x = -\frac{5}{3}$

[c] Determine the rectangular co-ordinates of the $x-$ and $y-$ intercepts.

θ	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$
r	-5	$\frac{5}{2}$	1	$\frac{5}{2}$

$(-5,0)$ $(-1,0)$ $(0,\frac{5}{2})$ $(0,-\frac{5}{2})$

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[d] Determine the rectangular co-ordinates of the vertices.

$(-5,0)$ $(-1,0)$

[e] Determine the rectangular co-ordinates of both foci.

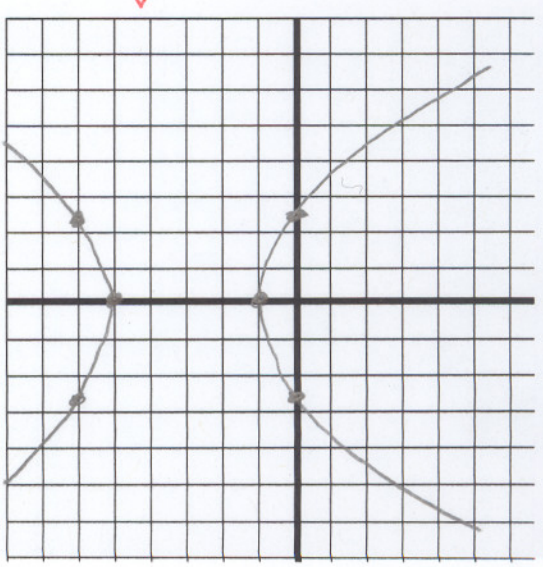
CENTER $= \left(\frac{-5+-1}{2}, \frac{0+0}{2}\right) = (-3,0)$

FOCUS $= (-6,0)$ AND $(0,0)$

[f] Determine the rectangular co-ordinates of the endpoints of both latera recta.

$(0,\frac{5}{2})$ $(0,-\frac{5}{2})$ $(-6,\frac{5}{2})$ $(-6,-\frac{5}{2})$

[g] Plot the points you found which lie on the conic, and then sketch the conic.



Graph the polar function $r = 1 - 2\cos 2\theta$ by answering the following questions first. **SCORE: ___ / 16 POINTS**

You must use techniques discussed either in lecture or in the handouts.

[a] Determine if the graph is symmetric over the polar axis.

$r = 1 - 2\cos 2(-\theta)$, 1

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

SYMMETRIC , 1

[b] Determine if the graph is symmetric about the pole.

$r = 1 - 2\cos 2(\pi + \theta)$, 1

$r = 1 - 2\cos(2\pi + 2\theta)$, $\frac{1}{2}$

$r = 1 - 2[\cos 2\pi \cos 2\theta - \sin 2\pi \sin 2\theta]$

$\frac{1}{2}$ $r = 1 - 2\cos 2\theta$, SYMMETRIC , 1

[c] Determine if the graph is symmetric over $\theta = \frac{\pi}{2}$.

SINCE THE GRAPH IS SYMMETRIC OVER BOTH THE POLAR AXIS AND THE POLE, IT IS AUTOMATICALLY SYMMETRIC OVER $\theta = \frac{\pi}{2}$. , 1

[d] What is the minimum interval of the graph that must be plotted first ?

$[0, \frac{\pi}{2}]$, 1

[e] Find all values of θ within the minimum interval at which the graph passes through the pole.

$1 - 2\cos 2\theta = 0$, FOR $0 \le \theta \le \frac{\pi}{2} \Rightarrow 0 \le 2\theta \le \pi$, 1

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

$2\theta = \frac{\pi}{3}$, 1

$\theta = \frac{\pi}{6}$, $\frac{1}{2}$

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[f] Find the maximum and minimum values of r.

AMPLITUDE = 2 MAX = 3 , $\frac{1}{2}$

MIDLINE = 1 MIN = −1 , $\frac{1}{2}$

[g] Find r and θ for all the quarter period points in the minimum interval.

PHASE SHIFT = 0

PERIOD = $\frac{2\pi}{2} = \pi$, $\frac{1}{2}$, $\frac{1}{2}$ $\frac{1}{4}$ PERIOD = $\frac{\pi}{4}$

θ	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$
r	−1	1	3

, $\frac{1}{2}$

[h] Plot the important points and graph the function.