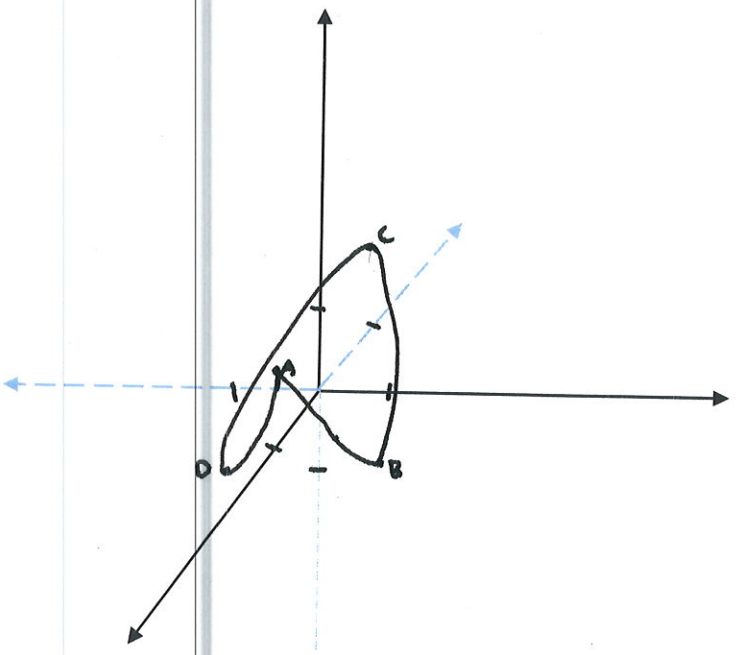
MAT 201, Quiz #2, Fall 2016 Name KEY

Instructions: Show all work. Answers without work required to obtain the solution will not receive full credit. Some questions may contain multiple parts: be sure to answer all of them. Give exact answers unless specifically asked to estimate.

1. Sketch the graph of the curve $\vec{r}(t) = \cos t\,\hat{\imath} + \sin t\,\hat{\jmath} + \cos 2t\,\hat{k}$. Be sure to label the axes. Plot about 10 points.

t	x	y	z	
-2π	1	0	1	A
$-3\pi/2$	0	1	-1	B
$-\pi$	-1	0	1	C
$-\pi/2$	0	-1	-1	D
0	1	0	1	E = A
$\pi/2$	0	1	-1	F = B
π	-1	0	1	G = C
$3\pi/2$	0	-1	-1	H = D
2π	1	0	1	I = A



2. For the vectors $\vec{a} = \langle 8, -1, 4\rangle, \vec{b} = -4\hat{\imath} + 2\hat{\jmath} + 4\hat{k}$, find $\vec{a} \times \vec{b}$.

$$\begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 8 & -1 & 4 \\ -4 & 2 & 4 \end{vmatrix} = (-4-8)\hat{\imath} - (32+16)\hat{\jmath} + (16-4)\hat{k}$$

$$-12\hat{\imath} - 48\hat{\jmath} + 12\hat{k}$$

3. Find a vector-valued function that represents the curve of intersection of the surfaces $z = \sqrt{x^2 + y^2}$ and $z = 1 + y$.

$$(1+y)^2 = \left(\sqrt{x^2+y^2}\right)^2$$

$$1 + 2y + y^2 = x^2 + y^2$$

$$1 + 2y = x^2$$

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

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

$x = t$

$y = \frac{t^2-1}{2}$

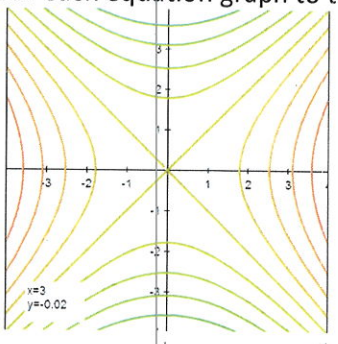
$z = 1 + y = \frac{1}{2}t^2 - \frac{1}{2} + 1 = \frac{1}{2}t^2 + \frac{1}{2}$

$\vec{r}(t) = t\hat{\imath} + \frac{1}{2}(t^2-1)\hat{\jmath} + \frac{1}{2}(t^2+1/2)\hat{k}$

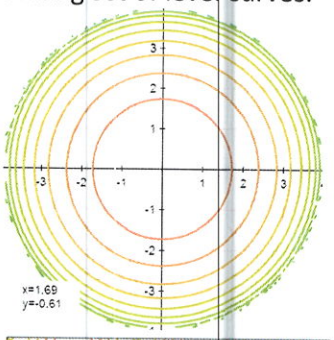
answers may vary

4. Match each equation graph to the corresponding set of level curves.

ii



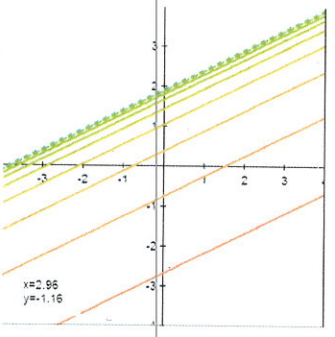
a.



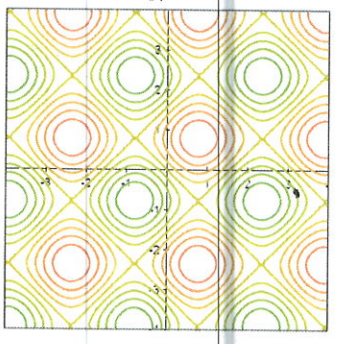
c.

iii

iv



b.



d.

i

i. $z = \sin(x+y)\cos(x-y)$ D

ii. $z = x^2 - y^2$ A

iii. $z = \sqrt{16 - x^2 - y^2}$ C

iv. $z = \ln(x - 2y + 4)$ B

Note: On these graphs, greener shades are smaller values of z, while redder shades are larger values. The dotted line represent vertical asymptotes.