MTH 265, Quiz #3, Fall 2018 Name KEY

**Instructions**: Show all work. Use exact answers unless otherwise asked to round.

1. Find $\lim_{(x,y)\to(0,0)} \frac{xy^4}{x^2+y^8}$ if it exists or prove that it does not.

$x^2 = y^8$ path(s)

$x = y^4$ $x = ky^4$

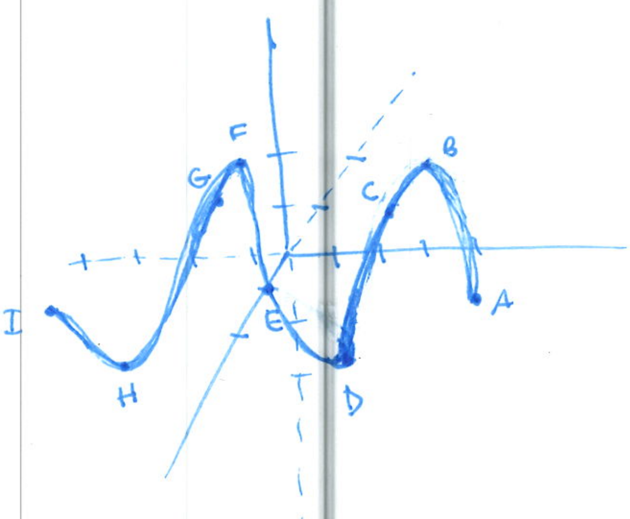
$$\lim_{y\to 0} \frac{ky^4y^4}{k^2y^8+y^8} = \lim_{y\to 0} \frac{k\cancel{y^8}}{\cancel{y^8}(k^2+1)}$$

$$= \lim_{y\to 0} \frac{k}{k^2+1} = \text{DNE depends on } k$$

~9 ok

2. Sketch the graph of the vector-valued function $\vec{r}(t) = \cos t\,\hat{\imath} - t\hat{\jmath} + 2\sin t\,\hat{k}$. Use 10 points, and at least 2 full cycles.

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

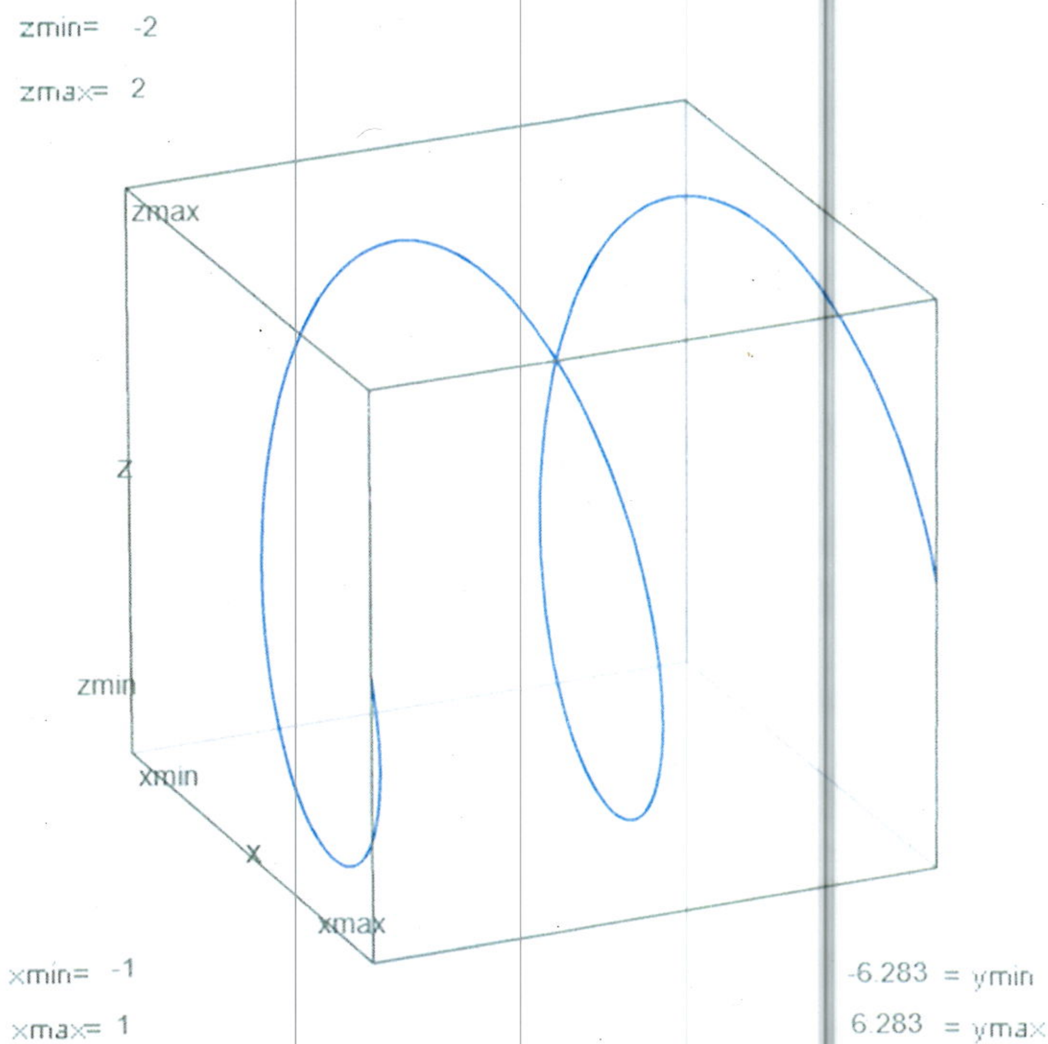



3. Using the function in #2, find the following:
   a. $\vec{r}'(t)$

$$r'(t) = -\sin t\,\hat{\imath} - 1\hat{\jmath} + 2\cos t\,\hat{k}$$

   b. $\int r(t)dt$

$$\int r(t)dt = (\sin t + C_1)\hat{\imath} + \left(-\frac{t^2}{2} + C_2\right)\hat{\jmath} + (-2\cos t + C_3)\hat{k}$$


zmin= -2
zmax= 2
zmax
Z
zmin
xmin
x
xmax
xmin= -1
xmax= 1
-6.283 = ymin
6.283 = ymax