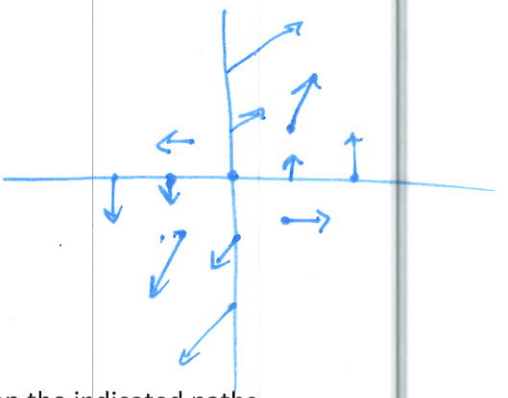
MTH 265, Quiz #4, Fall 2018 Name KEY

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

1. Sketch the vector field $\vec{F}(x,y) = y\hat{\imath} + (x+y)\hat{\jmath}$. Sketch at least 15 points by hand. Verify your graph with technology and include that graph with your solution.

X	Y	F
0	0	$\langle 0,0\rangle$
1	0	$\langle 0,1\rangle$
0	1	$\langle 1,1\rangle$
-1	0	$\langle 0,-1\rangle$
0	-1	$\langle -1,-1\rangle$
1	1	$\langle 1,2\rangle$
1	-1	$\langle -1,0\rangle$



X	Y	F
-1	-1	$\langle -1,-2\rangle$
-1	1	$\langle 1,0\rangle$
2	0	$\langle 0,2\rangle$
-2	0	$\langle 0,-2\rangle$
0	2	$\langle 2,2\rangle$
0	-2	$\langle -2,-2\rangle$

See attached

2. Evaluate the line integrals on the indicated paths.

a. $\int_C xyz\,ds,\ C: x = 2\sin t, y = t, z = -2\cos t, 0 \le t \le \pi$

$ds = \sqrt{(2\cos t)^2 + 1^2 + (2\sin t)^2} = \sqrt{5}\,dt$

$\sqrt{5}\int_0^{\pi} 4t\sin t\cos t\,dt =$

$u = t \quad dv = \sin t\cos t\,dt = \frac{1}{2}\sin 2t\,dt$

$du = dt \quad v = -\frac{1}{4}\cos 2t$

$4\sqrt{5}\left[-\frac{1}{2}t\cos 2t + \int \frac{1}{4}\cos 2t\,dt\right]$

$4\sqrt{5}\left[-\frac{1}{4}t\cos 2t + \frac{1}{8}\sin 2t\right]_0^{\pi} = 4\sqrt{5}\left[-\frac{1}{4}\pi(1) + \frac{1}{4}0(1) + \frac{1}{8}(0) - \frac{1}{8}(0)\right] =$

$= -\sqrt{5}\pi$

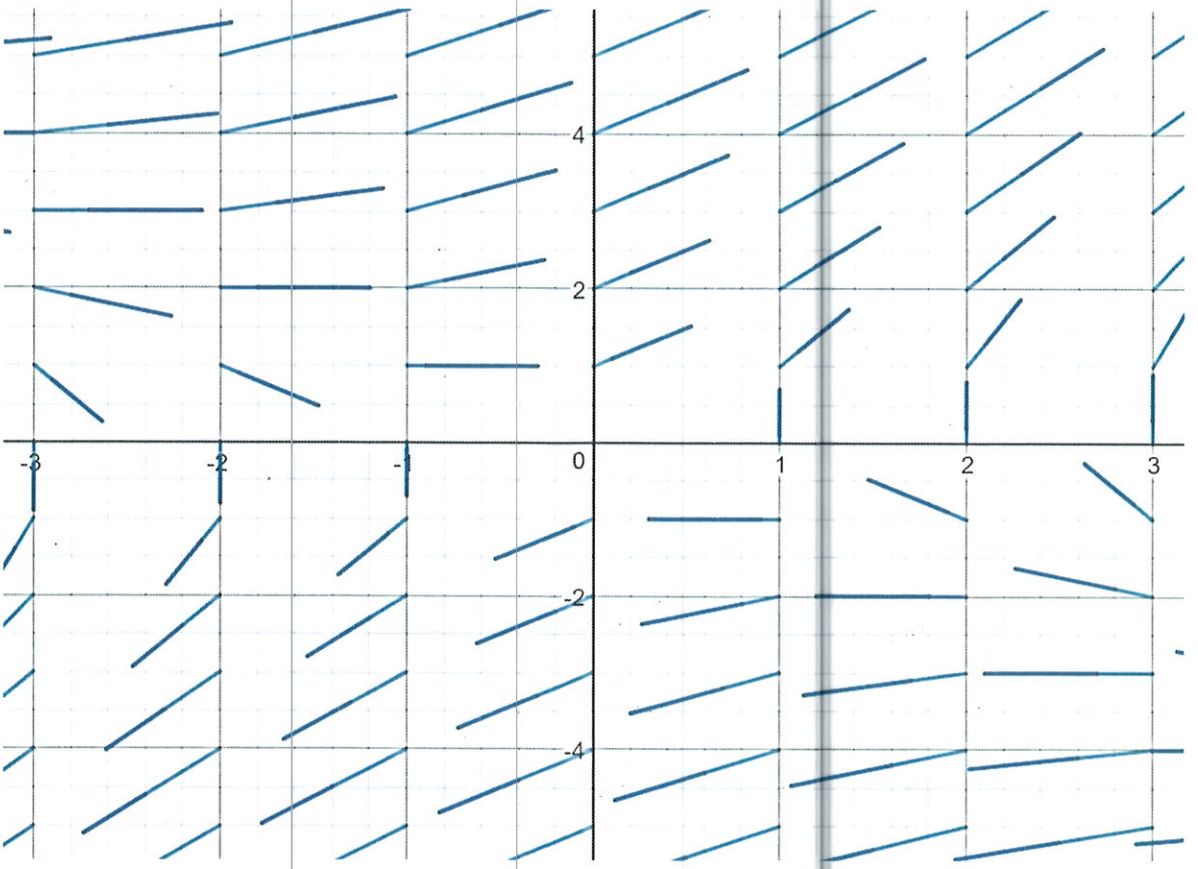
b. $\int_C \vec{F}\cdot d\vec{r},\ \vec{F}(x,y) = xy\hat{\imath} + 3y^2\hat{\jmath},\ \vec{r}(t) = 11t^4\hat{\imath} + t^3\hat{\jmath},\ 0 \le t \le 1$

$r'(t) = 44t^3\hat{\imath} + 3t^2\hat{\jmath}\,dt$

$F(t) = 11t^7\hat{\imath} + 3t^6\hat{\jmath}$

$\int_0^1 484t^{10} + 9t^8\,dt$

$44t^{11} + t^9\Big|_0^1 = 44 + 1 = 45$


4
2
-3
-2
-1
0
1
2
3
-2
-4