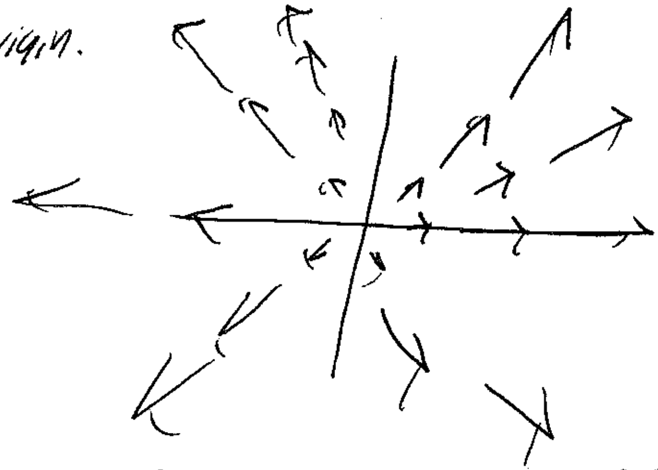
Name: SOLUTIONS

241S3 Quiz #8 - November 19, 2015, 10 a.m.

1. Sketch neatly the vector field $\vec{F}(x,y) = (x,y)$. Be sure to draw enough arrows so the behavior is clear.

Each arrow points out, length same as dist to origin.



2. Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ where C is given by $\mathbf{r}(t) = (t^2, t^3, -2t)$, $0 \le t \le 2$ and

$$\mathbf{F}(x,y,z) = (x + y^2, xz, y + z).$$

$$\int_0^2 \vec{F}(\vec{r}(t)) \cdot \vec{r}\,'(t)\,dt =$$

$$\int_0^2 (t^2+t^6, -2t^3, t^3-2t) \cdot (2t, 3t^2, -2)\,dt$$

$$= \int_0^2 2t^3 + 2t^7 - 6t^5 - 2t^3 + 4t \quad dt$$

$$= \int_0^2 2t^7 - 6t^5 + 4t \quad dt$$

$$= \frac{t^8}{16} - t^6 + 2t^2 \Big|_0^2$$

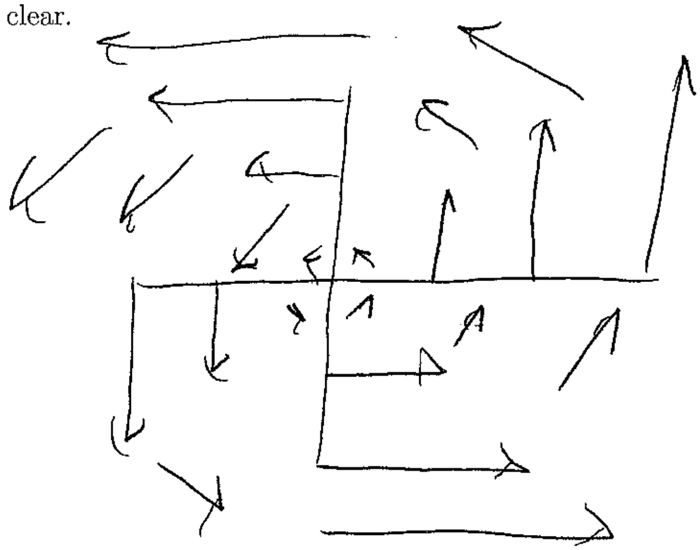
$$= 64 - 64 + 8$$

$$= 8$$

Name: SOLUTIONS

241S2 Quiz #9 - November 19, 2015, 11 a.m.

1. Sketch neatly the vector field $\vec{F}(x, y) = (-y, x)$. Be sure to draw enough arrows so the behavior is clear.



2. Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ where C is given by $\mathbf{r}(t) = (t^3, t^2)$, $0 \leq t \leq 1$ and

$$\mathbf{F}(x, y) = (xy^2, -x^2).$$

$$\int_0^1 \vec{F}(\vec{r}(t)) \cdot \vec{r}\,'(t)\,dt$$

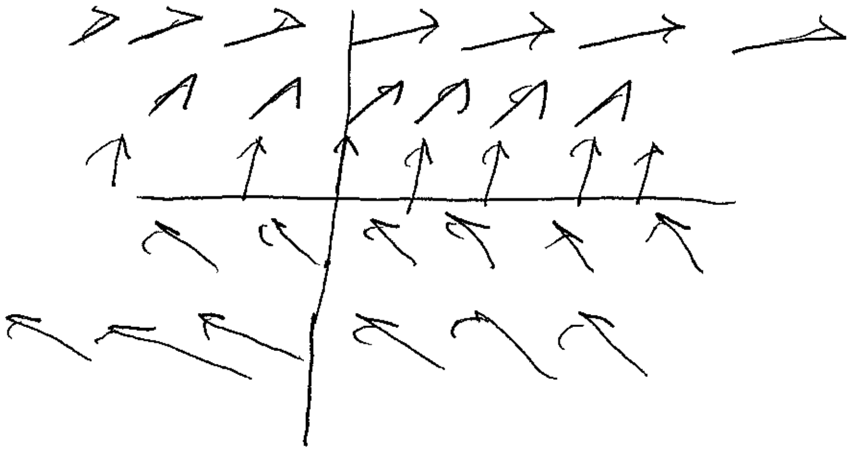
$$= \int_0^1 (t^3 \cdot t^2, -t^4) \cdot (3t^2, 2t)\,dt$$

$$= \int_0^1 3t^7 - 2t^7\,dt = \int_0^1 t^7\,dt = 1/8$$

Name: SOLUTIONS

241S1 Quiz #9 - November 17, 2015, 10 a.m.

1. Sketch neatly the vector field $\vec{F}(x, y) = (y, 1)$. Be sure to draw enough arrows so the behavior is clear.



Notice constant on each horiz line

2. Let C be the curve parameterized by $(t^2, 2t)$ for $1 \leq t \leq 4$. Evaluate the line integral:

$$\int_C y\, ds.$$

$$\sqrt{x'(t)^2 + y'(t)^2} = \sqrt{4t^2+4} = 2\sqrt{t^2+1}$$

$$\int_1^4 y(t) \cdot 2\sqrt{2t^2+1}\, dt$$

$$= \int_1^4 4t\sqrt{2t^2+1}\, dt = \frac{2}{3}(2t^2+1)^{3/2}\Big|_1^4$$

$$= \frac{2}{3}\left(33^{3/2} - 3^{3/2}\right)$$