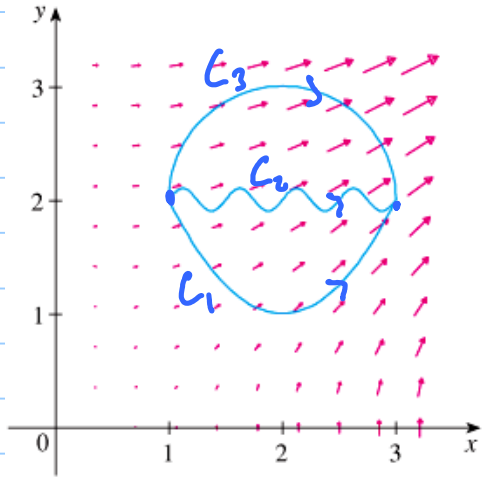
Calc 3 - Assignment 27

(1) The figure below shows the vector field $\vec{F} = \langle 2xy, x^2 \rangle$ and three curves from $(1,2)$ to $(3,2)$. Explain why $\int_C \vec{F}\, d\vec{r}$ has the same value for all three curves C_1, C_2, C_3, and find that value.

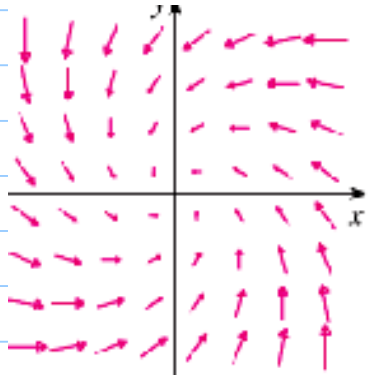


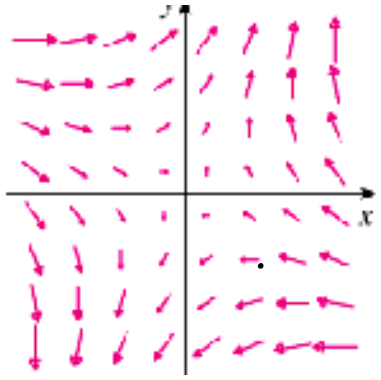
(2) Evaluate $\int_C \vec{F}\, d\vec{r}$ where $\vec{F} = \langle x^2, y^2 \rangle$ and C is the part of the parabola $y = 2x^2$ from $(-1,2)$ to $(2,8)$ using (a) line integration, and (b) the Fund. Thm.

(3) Evaluate $\int_C yz\, dx + xz\, dy + (xy + 2z)\, dz$, where C is the line segment from $(1,0,-2)$ to $(4,6,3)$ using (a) line integration, and (b) the Fund. Thm.

(4) Find $\int_C \tan(y)\, dx + x \sec^2(y)\, dy$, C any path from $(1,0)$ to $(2, \pi/4)$

(5) Which vector field is conservative?





(6) Is $\int_C y\,dx + x\,dy + xyz\,dz$ independent of the path?

(7) Find the value of the work integral

$$\oint_C 3x^2y^2 + \sin(y^2)\,dx + 2x^3y + x\cos(y^2)\,2y\,dy$$

where C is $\langle 2\cos(t), 3\sin(t) \rangle$, $t \in [0, 2\pi]$.

(there is an easy trick for this!)