MATH 1920, Fall 2017
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Sections: 201, 202

Name:_____

Section 17.1 and 17.2 Review

Section 17.1 Additional Exercises

1. Sketch the following planar vector fields by drawing the vectors attached to points with integer coordinates in the rectangle $-3 \leq x \leq 3$, $-3 \leq y \leq 3$. Instead of drawing the vectors with their true lengths, scale them if necessary to avoid overlap.

   a) $\mathbf{F} = \langle 0, x \rangle$

   b) $\mathbf{F} = x^2\mathbf{i} + y\mathbf{j}$

2. Calculate div($\mathbf{F}$) and curl($\mathbf{F}$).

   a) $\langle xy, yz, y^2 - x^3 \rangle$

   b) $\sin(x + z)\mathbf{i} - ye^{xz}\mathbf{k}$

3. Find by inspection a potential function for $\mathbf{F} = \langle x, 0 \rangle$ and prove that $\mathbf{G} = \langle y, 0 \rangle$ is not conservative.

4. Find a potential function for the vector field $\mathbf{F}$ by inspection or show that one does not exist.

   a) $\mathbf{F} = \langle x, y \rangle$

   b) $\mathbf{F} = \langle yz^2, xz^2, 2xyz \rangle$

   c) $\mathbf{F} = \langle yz\cos(xyz), xz\cos(xyz), xy\cos(xyz) \rangle$

Section 17.2 Additional Exercises

1. Compute

$$\int_C f \, ds$$

for the specified curves.

(a) The piecewise linear path from $(0,0,1)$ to $(0,2,0)$ to $(1,1,1)$ for $f(x,y,z) = xe^{z^2}$.

(b) $f(x,y) = \sqrt{1+9xy}$ and the curve $y = x^3$ for $0 \leq x \leq 1$

2. Compute

$$\int_C \boldsymbol{F} \cdot d\boldsymbol{r}$$

for the oriented curve specified.

(a) $\boldsymbol{F}(x,y) = \langle x^2, xy \rangle$, for the line segment from $(0,0)$ to $(2,2)$

(b) $\boldsymbol{F}(x,y) = \langle x^2, xy \rangle$, for part of the circle $x^2 + y^2 = 9$ with $x \leq 0$, $y \geq 0$, oriented clockwise.

3. Evaluate the line integral

$$\int_C y dx - x dy,$$

parabola $y = x^2$ for $0 \leq x \leq 2$.