

Math 13, Winter 2018

Homework set 6, due Wed Feb 14

Please show your work. No credit is given for solutions without justification.

- (1) Calculate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$, for the vector field $\mathbf{F} = \langle x, y, z \rangle$ and the straight line segment C from $(1, 0, 1)$ to $(2, 2, 0)$.
- (2) Let $\mathbf{F} = \langle 2xy, 3y^2z + x^2, y^3 + 2z \rangle$.
 - (a) Calculate $\text{curl } \mathbf{F}$.
 - (b) Is \mathbf{F} conservative? If your answer is “No”, explain why not. If your answer is “Yes”, find a potential function.
 - (c) Calculate $\int_C \mathbf{F} \cdot d\mathbf{r}$ if C is the helix $\mathbf{r}(t) = \langle \cos t, t, \sin t \rangle$ with $0 \leq t \leq 2\pi$.
- (3) Find an equation for the tangent plane to the sphere $x^2 + y^2 + z^2 = 9$ at the point $(1, 2, 2)$.