

## Math 250B Assignment

Name: \_\_\_\_\_

This assignment has 5 questions.

Covers Sections: 14.1-14.4

Due: At the beginning of class, Monday Dec. 2

### INSTRUCTIONS:

Show all your work for full marks.

You may discuss with others but you may not copy another person's work.

If you are away on the due date then you can submit to the D2L Dropbox.

1. [4 marks] Calculate the divergence and curl of  $\mathbf{F} = [x^2 - yz, e^y - xz, z^3 - y^2]$ .

2. [4 marks] Evaluate  $\int_C (2x + 3z) ds$ , where C is given by:

$$x = 3 \cos t, \quad y = 3 \sin t, \quad z = 4t, \quad 0 \leq t \leq 4\pi$$

3. [3 marks] Consider the conservative vector field  $\mathbf{F} = [2x, 3y^2z, y^3 - 2z]$ .

a) Find a potential for  $\mathbf{F}$

b) Let  $C$  be any path from  $(1, 2, 3)$  to  $(4, 3, 5)$ . Evaluate  $\int_C \mathbf{F} \cdot d\mathbf{r}$

4. [5 marks] Let  $C$  be the part of  $y = x^2$  from  $(0, 0)$  to  $(2, 4)$  followed by the straight line segment from  $(2, 4)$  to  $(0, 0)$ . Use Green's Theorem to evaluate  $\oint_C [\arctan e^x dx + (x^2 + \arcsin e^y)dy]$

5. [4 marks] Use the 2D Divergence Theorem to calculate the flux of  $\mathbf{F} = [xy^2, x^2y + \ln(\sin x)]$  across the circle of radius 6 centred at the origin.