SECTIONS 17.3,17.4 NAME: _____

Math 1920 - Andres Fernandez November 8, 2018

PROBLEMS

(1) Show that the integral along any closed path of a conservative vector field is 0.

(2) Find the integral of the following vector fields along the path given in the board, or explain why it cannot be done with the information given:

(a) $\langle z\sec^2(x), z, y + \tan(x)\rangle$

(b) $\langle y, e^{xy}, e^z\rangle$

(c) $\langle 2yx\cos(z) + 3x^2, x^2\cos(z) - 3y^2\sin(z), -x^2y\sin(z) + 3z - y^3\cos(z)\rangle$

(d) $\langle \frac{\tan(x)\cos(2y^2)}{x^2+y^2}, \frac{tan(x)+3x^2-y}{x^2+y^2}, \frac{2y^2-5\tan(y)+3zx^4}{x^2+y^2}\rangle$

(3) Calculate the surface integral in each of the following cases:

(a)
$$\int\int_{\mathcal{D}} x^2 dS \qquad \text{where } \mathcal{D} \text{ is given by } x^2 + y^2 + z^2 = 9 \text{ and } x, y, z \geq 0$$

(b)
$$\int\int_{\mathcal{D}} z dS \qquad \text{where } \mathcal{D} \text{ is given by } x + y + z = 1 \text{ and } x, y, z \geq 0$$

(c)
$$\int\int_{\mathcal{D}} e^{-z} dS \qquad \text{where } \mathcal{D} \text{ is a vertical cylinder of radius 4 and bounded between } 0 \leq z \leq 4$$

(4) Find the surface area of the part of the cone given by $x^2 + y^2 = z^2$ between the planes $z = 2$ and $z = 5$.