Homework Set 11

DUE: NOV 25, 2019 (AT THE BEGINNING OF CLASS)

To be handed in:

Please write your solution to Problem 1 on a single sheet of paper!

1. Determine if the following vector fields $\vec{F}\colon \Omega \subset \mathbb{R}^n \to \mathbb{R}^n$ are conservative. In case they are conservative, find a potential function f, that is, such that $\vec{F} = \nabla f$.

   a) $\vec{F}(x,y) = \big(xy^2, x^2y\big), \quad \Omega = \mathbb{R}^2$

   b) $\vec{F}(x,y,z) = \big(ye^x, 2y\sin(z), x+z\big), \quad \Omega = \mathbb{R}^3$

   c) $\vec{F}(x,y) = \left(\dfrac{x}{x^2+y^2}, \dfrac{y}{x^2+y^2}\right), \quad \Omega = \mathbb{R}^2 \setminus \{(0,0)\}$

NOT to be handed in (but recommended for you to practice with):

2. Textbook (5th edition) Section 15.1, Exercises 1-8, 35-37, 45-48, 57-61