MAT226, Spring 2020   **Renato Ghini Bettiol**

Homework Set 11

To be handed in:

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

1. Compute the line integrals of the following vector fields $\vec{F}\colon \Omega \subset \mathbb{R}^n \to \mathbb{R}^n$. Remember that if the vector field is conservative, then this computation is substantially easier using a potential function. However, if the vector field is not conservative, then the parametrization of the curve must be used.

   a) $\vec{F}(x,y) = \left(x^2 y, xy^2\right)$,
      $\gamma(t) = (\cos t, \sin t), \quad t \in [0, 2\pi]$

   b) $\vec{F}(x,y,z) = \left(ze^y, 2x\sin(z), x+z+1\right)$,
      $\gamma(t) = (t^2 + 1, t, 0), \quad t \in [0,1]$

   c) $\vec{F}(x,y) = (e^x \cos y, -e^x \sin y)$,
      $\gamma(t) = \left((1 + (-1)^t)\cos(t^6 - 4t^2 + \ln t), \pi t\right), \quad t \in [3,5]$

   Hint: Note that the above vector fields are exactly the same as those you analyzed in HW10.

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

2. Textbook (5th edition) Section 15.2, Exercises 2, 3, 39, 40, 45, 46, 77

3. Textbook (5th edition) Section 15.4, Exercises 7-10, 47-49