MATH 203 Calculus III
Homework 19

Basic Information
This assignment is due on Gradescope by **3 PM on Tuesday, November 26**.

Make sure you understand MHC honor code and have carefully read and understood the additional information on the class syllabus. I am happy to discuss any questions or concerns you have!

Since this is a 200-level mathematics course, quite a few homework questions will ask you to explain your reasoning or process for solving a problem. Whenever possible, write your explanations in complete sentences and write your answers as if you were explaining to a peer in the class.

The homework problems will be graded anonymously so please do not put your name or other identifying information on the pages.

Turn In Problems
14.1: 16
14.3: 8, 12
#4[1]. Find the gradient vector field of $f(x,y) = xe^{xy}$.
#5. On the next page are plots of 4 vector fields. Match those with the vector fields listed below:

(a) $\vec{F}(x,y) = \langle 1,2,3 \rangle$
(b) $\vec{F}(x,y) = \langle 1,2,z \rangle$
(c) $\vec{F}(x,y) = \langle x,y,3 \rangle$
(d) $\vec{F}(x,y) = \langle x,y,z \rangle$

#6. For the following vector fields, either show they are not conservative or find a potential function for them.

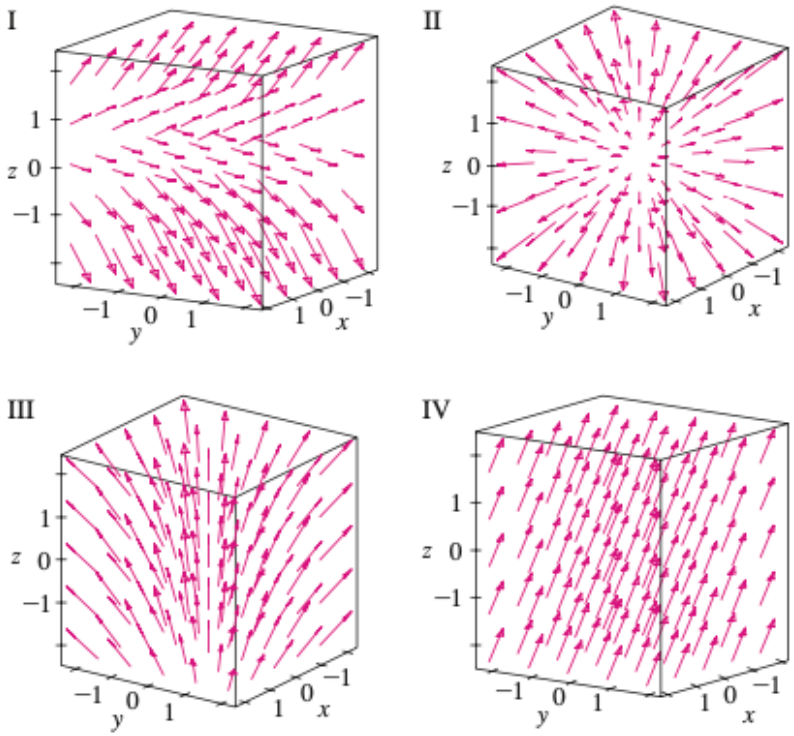
(a) $\vec{F}(x,y,z) = \langle \cos(xz),\ \sin(yz),\ xy \sin z \rangle$
(b) $\vec{F}(x,y,z) = \langle y^2,\ 2xy + e^z,\ ye^z \rangle$

Additional Problems (to do on your own, not to turn in)
14.1: 15
14.3: 9, 11

- Find the gradient vector field of $f(x,y) = \tan(3x - 4y)$.
- For the following vector fields, either show they are not conservative or find a potential function for them.

  (a) $\vec{F}(x,y,z) = \langle \cos z,\ 2y,\ -x \sin z \rangle$
  (b) $\vec{F}(x,y) = \langle xe^y,\ ye^x \rangle$

[1] #4 and 5, and the last problem in the additional problems section are from Stewart Calculus 6th edition, pages 1032 and 1043.


I
II
III
IV
z
x
y
1
0
−1