



Some thoughts and advice:

- You should expect to spend at least 1 – 2 hours on problem sets. A lot of practice problem-solving is essential to understand the material and skills covered in class. Be organised and do not leave problem sets until the last-minute. Instead, get a good start on the problems as soon as possible.
- When approaching a problem think about the following: *do you understand the words used to state the problem? what is the problem asking you to do? can you restate the problem in your own words? have you seen a similar problem worked out in class? is there a similar problem worked out in the textbook? what results/skills did you see in class that might be related to the problem?*

If you are stuck for inspiration, use the course **piazza** forum (accessible via the course Canvas site). However, don't just ask for the solution - provide your thought process, the difficulties you are having, and ask a coherent question in complete English sentences. Remember the 3RA approach to asking questions outlined in the course syllabus.

- Form study groups - get together and work through problem sets together. **This will make your life easier!** However, you must write your solutions *on your own* and *in your own words*.
 - * * * You **are not allowed** to use any additional resources (e.g. solution manuals, **stackoverflow** etc). If you are concerned then please ask.
 - The problems in parentheses are for extra practice and optional (in particular, they do not need to be submitted). **Problems for submission from the textbook are underlined. Additional problems not from the textbook must be submitted.**
- To gain mastery of a topic you should expect to attempt a significant proportion of the problems in the textbook (> 60%(!)).
- Answers to odd-numbered exercises are at the back of the textbook. However, you need to submit a worked solution and provide justification for how you determined the answer.

• **Read/recap:** §3.3

- **Problems:** § $X.y$ refers to Chapter X , Section y of *Vector Calculus*, by Colley (4th Edition). All problems are taken from the 4th Edition.

§3.3: (1), 2, 3, (4), 17, (18), 20,

Problem A: Match the vector field with the corresponding plot.

$$1. \underline{F}(x, y) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \quad 2. \underline{F}(x, y) = \begin{bmatrix} \frac{x}{\sqrt{x^2+y^2}} \\ \frac{y}{\sqrt{x^2+y^2}} \end{bmatrix}, \quad 3. \underline{F}(x, y) = \begin{bmatrix} \frac{-y}{\sqrt{x^2+y^2}} \\ \frac{x}{\sqrt{x^2+y^2}} \end{bmatrix}, \quad 4. \underline{F}(x, y) = \begin{bmatrix} 2 \\ y \end{bmatrix}$$

$$5. \underline{F}(x, y) = \begin{bmatrix} 2x \\ y \end{bmatrix}, \quad 6. \underline{F}(x, y) = \begin{bmatrix} 2x + y \\ y \end{bmatrix}, \quad 7. \underline{F}(x, y) = \begin{bmatrix} \frac{-y}{\sqrt{x^2+y^2}} \\ \frac{x-y}{\sqrt{x^2+y^2}} \end{bmatrix}, \quad 8. \underline{F}(x, y) = \begin{bmatrix} y \\ y \end{bmatrix}$$

