Middlebury College

Multivariable Calculus: Spring 2018

Homework

Due February 26, 4pm

Contact: gmelvin@middlebury.edu

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 are underlined**.

  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:** §1.7
- **Problems:** §$X.y$ refers to Chaper X, Section y of *Vector Calculus*, by Colley (4th Edition). All problems are taken from the 4th Edition.

  §1.7: (1), 3, 6, (7), 9, (14), 15, 20a, 36ab

  Problem A: Sketch the curve described by the polar equation.

  1. $r = 4\cos\theta + 2\sin\theta$
  2. $r^2 \sin 2\theta = 2$

  Problem B: Consider the polar equation $r = 1 + \sin\theta$. Show that the curve defined by this equation is symmetric about the $y-$axis i.e. if (x, y) is a point on the curve (in Cartesian coordinates) then $(-x, y)$ is a point on the curve (in Cartesian coordinates).