Middlebury College

Calculus II: Spring 2018
Homework
Due May 4, 6pm

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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), come to office hours, or send me an email. 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. **This will make your life easier!** You can use `piazza` to arrange meet-ups. However, you must write your solutions *on your own* and *in your own words*.
- If you would like more practice then there are (hundreds of) problems in the supplementary course textbooks mentioned in the syllabus, or you can check out `khanacademy.org`.
- You **are not allowed** to use any additional resources. If you are concerned then please ask.

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1. Find the length of the curve.
   (a) $y = x^{3/2}$ between $x = 1$ and $x = 8$.
   (b) $y^2 = (x-1)^3$ between $(1,0)$ and $(2,1)$.
   (c) $y = \frac{e^x+e^{-x}}{2}$ between $x = 0$ to $x = 4$.
   (d) $y = \frac{x^3}{12} + \frac{1}{x}$ between $x = 1$ to $x = 4$.
2. Find the surface area of the surface of revolution.
   (a) $y = x^3$, $0 \le x \le 1$, about the x-axis.
   (b) $y = x^{3/2}$, $0 \le x \le 1$, about the x-axis.
   (c) $y = e^x$, $0 \le x \le 1$, about the x-axis.
   (d) $y = \sin(x)$, $0 \le x \le \pi$, about the x-axis.
3. Determine the surface area of the surface of revolution obtained by rotating the curve $y = x^{3/2}$ about the y-axis, $0 \le x \le 1$.
4. (a) Determine the surface area of a circular cone of bas radius r and height h. *Hint: realise the cone as a surface of revolution.*
   (b) Determine the surface area of the surface of revolution obtained by rotating the circle $x^2 + (y-2)^2 = 1$ about the x-axis. This computation computes the surface area of a donut.