The problems on this worksheet are for in-class practice during tutorial. You are free to collaborate and to ask for help. They don't count for course credit, but it's a good idea to make sure you know how to do everything before you leave tutorial – similar problems may show up on a test or assignment.

1. Evaluate the improper integral, or explain why it does not exist:
   (a) $\displaystyle\int_0^\infty e^{4-3x}\,dx$
   (b) $\displaystyle\int_{-\infty}^\infty \frac{1}{4+x^2}\,dx$
   (c) $\displaystyle\int_{-\infty}^\infty \frac{x}{1+x^2}\,dx$
   (d) $\displaystyle\int_1^\infty \frac{\ln x}{x^2}\,dx$
2. Find the area between the given curves:
   (a) $y = x^2 - 3x + 2$, and $y = -3x + 3$
   (b) $y = \sqrt{x}$, $y = -2x + 3$, and $y = -\frac{1}{2}x$.
3. Find the volume of the solid of revolution:
   (a) Generated by revolving the region bounded by $y = x^2 - 2x + 2$ and $y = 2x - 1$ about the x-axis.
   (b) Generated by revolving the region bounded by $y = x^2 - 2x + 2$ and $y = 2x - 1$ about the line $y = 1$.
   (c) Generated by revolving the triangle with vertices $(1, 1), (1, 2)$, and $(2, 1)$ about the y-axis.
   (d) Generated by revolving the triangle with vertices $(1, 1), (1, 2)$, and $(2, 1)$ about the x-axis.
4. Find the length of the curve $y = 2x^{3/2} - \dfrac{1}{\sqrt{6}}\sqrt{x}$, for $0 \le x \le 9$.
5. Find the area of the surface generated by revolving the the curve $y = x^2$, for $0 \le x \le 1$, about the y-axis.
6. Find the area enclosed by the following regions:
   (a) The region above the x-axis and below the spiral $r = \theta$, for $0 \le \theta \le \pi$.
   (b) The region given by the part of the first quadrant inside the curve $r = 1 + \sin\theta$.
   (c) One loop of the curve $r = \sin 4\theta$.
   (d) The inner loop of the curve $r = 1 + 2\sin\theta$.

Diagrams for problem 6: