# Math 1B Discussion Section Problems

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September 17, 2007

You should work on the following problems in groups of 3 or 4. Try to get through as many as you can, but you aren't expected to finish everything. Instead, you should make sure everyone in your group knows **how** to solve all the problems, and not just the answers.

1. Which of the following integrals are improper? For those that are improper, show how you would break them up into the limit of proper integrals:
   (a) $\int_0^{\pi/2} \sec x dx$
   (b) $\int_{-3}^{3} \frac{1}{x^2+1} dx$
   (c) $\int_{-3}^{3} \frac{1}{x^2-1} dx$
   (d) $\int_{-\infty}^{\infty} \frac{x^2+\cos x}{\sqrt[5]{x}} dx$
   (e) $\int_{\pi/4}^{3\pi/4} \tan x dx$
2. Determine whether each of the following integrals converges or diverges.
   (a) $\int_1^{\infty} \frac{1}{x+e^{2x}} dx$
   (b) $\int_3^{\infty} \frac{1}{x^2+x^3+x^4} dx$
3. What is the length of the curve $y = \frac{x^2+1}{2}$ between $x = 0$ and $x = 2$?
4. Find the length of the curve $y = \ln(\cos x)$ for $0 \leq x \leq \pi/3$
5. Is the length of the curve $y = \ln x$ finite on the interval $[0, 1]$?
6. - Sketch the graph of the curve $f(x) = x \sin(1/x)$ for $0 < x \leq 1$
   - Is the arc length of this graph finite or infinite?