Math 1B Discussion Section Problems

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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. Show that if $f(x)$ is a polynomial of degree less than or equal to 3, then Simpson's rule **always** gives you the exact value of $\int_1^{300} f(x)dx$
2. Find each of the following, if they exist:
   (a) $\lim_{x\to\infty} \frac{x^4+3x^2+1}{2x^4-x}$
   (b) $\lim_{x\to\pi/2-} \tan x$
   (c) $\lim_{x\to\infty} \frac{e^x}{x^2}$
   (d) $\lim_{x\to\infty} x\ln(x)$
   (e) $\lim_{x\to 0} \frac{|x|}{x}$
3. Find $\int_{-\infty}^{0} e^{5x}dx$
4. Find $\int_{-\infty}^{\infty} \frac{1}{x^2}dx$
5. Determine each of the following, or state that they do not exist:
   (a) $\lim_{t\to\infty} \int_{-t}^{t} 2x\,dx$
   (b) $\lim_{t\to\infty} \int_{-t}^{t+1} 2x\,dx$
   (c) $\lim_{t\to\infty} \int_{-t}^{\sqrt{t^2+1}} 2x\,dx$
   (d) $\int_{-\infty}^{\infty} 2x\,dx$
6. Find $\int_0^1 \frac{1}{\sqrt{1-x}}\,dx$