Math 1720 Homework 1A, due Wednesday Jan 25
More homework to be posted Friday.

1. Use a left Riemann sum with $\Delta t = 0.5$ to estimate $\ln(3)$. Is the estimate an overestimate or underestimate?

2. Use a right Riemann sum with $\Delta t = 1$ to estimate $\ln(16)$. Is the estimate an overestimate or underestimate?

3. In class on Friday I (will/did) use Riemann sums to show that

$$\ln(4) > \frac{2}{2}.$$

and that

$$\ln(8) > \frac{3}{2}.$$

Use your calculations from problem 2 to similarly show that

$$\ln(16) > \frac{1}{2} + \frac{1}{4} + \frac{1}{4} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} +$$

$$+ \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16},$$

and therefore that $\ln(16) > \frac{4}{2}$.

Use the same method to show that $\ln(32) > \frac{5}{2}$.

(In general this method can be used to show that $\ln(2^n) > \frac{n}{2}$. As $n \to \infty$, both $2^n \to \infty$ and $n/2 \to \infty$. Since ln is an increasing function, this implies $\lim_{x\to\infty} \ln(x) = \infty$.)

4. Compute $\ln'(12)$ and $\ln''(12)$.