QTips: Tips for Q3 11am

1) The quiz is testing your ability to use the two comparison tests. If you don’t use one of the two, you’ll lose all points. You will be making comparisons to either geometric series or p-test.

2) You’ll need to know a precise statement of the tests. For example, LCT asks $0 < L < \infty$. Some people write it as $0 \leq L \leq \infty$, which is wrong and can in cases cause loos of points.

3) If you use L’Hop, you have to actually check the $\frac{0}{0}$ or $\frac{\infty}{\infty}$ – not just say it because all the other problems were OK.

4) If you use L’Hop, you have to change your $n$ to $x$:

$$\lim_{n \to \infty} \frac{\ln(n)}{n} = \lim_{x \to \infty} \frac{[\ln(x)]'}{x'} = \lim_{x \to \infty} \frac{1}{x} = 0$$

5) If you use an inequality, you have to check it. In the example below, you would lose points for not showing work:

$$\frac{1}{\sqrt{n^2 + n - 1}} \leq \frac{1}{n}$$

6) A reminder: you can’t compute limits using shortcuts like this:

$$\lim_{n \to \infty} \frac{n^2 - n + 1}{n^3 + n^2 + n} \approx \frac{n^2}{n^3} = \frac{1}{n} \to 0$$

How did $\lim_{n \to \infty}$ disappear? What does $\approx$ mean? What’s $\to$?

Either do

$$\lim_{n \to \infty} \frac{n^2 - n + 1}{n^3 + n^2 + n} = \lim_{n \to \infty} \frac{\frac{1}{n} - \frac{1}{n^2} + \frac{1}{n^3}}{1 + \frac{1}{n} + \frac{1}{n^2}} \frac{0}{1} = 0$$

or use L’Hospital’s rule:

$$\lim_{n \to \infty} \frac{n^2 - n + 1}{n^3 + n^2 + n} = \frac{\infty}{\infty} = \lim_{x \to \infty} \frac{2x - 1}{3x^2 + 2x + 1} = \frac{\infty}{\infty} = \lim_{x \to \infty} \frac{2}{6x + 2} = 0$$