Week 3 - Limits; Improper definite integrals

If you want to do some reading before the class and don't like (or haven't got) the "recommended textbook", then have a look at the free tutorials Paul Dawkins has put on the web. Here is his basic tutorial on limits, and here are his notes on improper integrals.

(continued)

OK so in class today we just looked at the definition and examples of limits and of improper integrals:

- Limits:
  - We looked at the limit as x approaches infinity of the function $f(x) = x^n$ for all possible values of n. We also mentioned what happens as x approaches *minus* infinity , but only in the cases that n is an *integer*! If n=1/2 then f(x) is not even defined when x<0.
  - We considered different types of limit
    - as x approaches a constant c from the left (x<c) or from the right (x>c)
    - as x approaches plus or minus infinity
    - as x approaches a number c
  - the last type - the "limit at c" - is only defined if the limits from the left and the right are equal. This is Theorem C on this Visual Calculus page - we also looked at the last 4 examples on this page in class and in the tutorial.
  - The basic methods to calculate limits are simplification by factoring or rationalising (by multiplying by a conjugate) and then cancelling.
  - Another introduction, and many examples (including three more of the tutorial exercises!) are discussed in detail on this page.
  - For practice, we also looked at (almost) all of the exercises here
- Improper integrals
  - Another nice introduction to the two basic types of improper integrals can be found on this page by William W Farr
  - We did four basic examples on the board
    - two *"unbounded"* integrals similar to those explained in detail on this Visual Calculus page (which also explains the **first two** tutorial exercises)
    - and two where the integrand *isn't always defined*, similar to those explained in detail on this Visual Calculus page (which also explains the **last three** tutorial exercises)
  - The other tutorial exercises, and their solutions, may be found here
  - If you feel you need more basic practice and you want to be shown how to do some more examples, generated fairly randomly, have a look at this page.