Integrals on the TI-83

Graphing calculators such as TI-83 cannot find antiderivatives (although computer software packages such as Mathematica and Maple, and the most powerful graphing calculators such as the TI-92 can do so.) Therefore the TI-83 cannot evaluate even simple integrals by using the Fundamental Theorem of Calculus: it must do a numeric approximation of some kind, such as, for example, Simpson's Rule. (In fact, the TI-83 uses a more sopisticated method called the Gauss-Kronrod method, not discussed in class).

The command for (approximately) evaluating integrals is *fnInt*, found as item 9 on the MATH menu. To use it, the syntax is *fnInt (function, variable, lower limit, upper limit)*. For example, to approximate $\int_0^2 e^{-x^2} dx$, use the command

fnInt(e^($-$ x^2), x ,0 ,2) The TI-83 returns the answer 0.882 081 3908

(Notes: 1. If you have entered Y_1=e^($-$ x^2) in the "Y=" window, you can also use the command fnInt(Y_1(x), x, 0, 2)

2. If you have a graph on the screen, you can also use the command " $\int$f(x)dx " on the CALC menu to find the integral between certain limits: the TI-83 prompts you for the limits and shades in, on the graph, the computed area (positive or negative).)

You can also use the TI-83 to graph functions such as $y = F(x) = \int_0^x e^{-t^2} dt$. To do this, enter

Y_1 = fnInt(e^($-$ t^2), t, 0, x) in the "Y=" window and use the graph command.

If you try this, you'll see that the graphing is painfully slow!! To do the graph, the TI-83 normally plots a point for each "pixel" on the x-axis. For each x value, the TI-83 has to compute the value of the integral to get the necessary y-coordinate, which takes a lot of time. You can speed this up by having the TI-83 plot fewer points – the graph may be a little grainier, but may still be useful. To do this, hit "WINDOW" and increase the setting *Xres* from 1 to a higher number (2, 3, ... , 8). (Xres=3, for example, means that a point is plotted only for every 3^{rd} pixel along the x-axis, so that only about 1/3 as many y-coordinates have to be computed.)