WEEKLY 3
APPLIED CALCULUS
DUE 09-10

Show your work! Notice the homework is due *Monday*.

(1) Two friends, Alice and Bob, are trying to compute $\frac{\mathrm{d}}{\mathrm{d}x}(e^x)\big|_{x=3}$.

   (a) Alice sets up the limit
$$\lim_{h \to 0} \frac{e^{3+h} - e^3}{h}.$$
   Use a calculator to approximate the answer that she gets, to at least 4 significant figures.

   (b) Bob sets up the limit
$$\lim_{x \to 3} \frac{e^x - e^3}{x - 3}.$$
   Use a calculator to approximate the answer that he gets, to at least 4 significant figures.

   (c) Even though Alice is using the limit we set up in class, and Bob isn't, they get the same answer. Explain, in complete English sentences, why Bob's limit is a reasonable way to compute the instantaneous slope.

(2) Alice, Bob, and their friend Carrie go driving in three separate cars. Draw a graph of the *distance* (not the speed) travelled by each car as a function of time. Be sure to label which graph is which.

   (a) Alice drives at a constant speed.

   (b) Bob drives at an increasing speed.

   (c) Carrie starts at high speed, then decreases her speed slowly.

• **Three** book problems: #11.4.18, 26, 35. Be sure to **show your work** and **explain all answers**. You **must** use the limit definition to compute the derivatives in §11.4. Even if you know derivative rules, you may use them only to *check* your answers.