21-320 Homework set 1

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Due in class on Monday 31 January.

1. (10 points) Draw a tree representing the result of parsing the expression `diff(x^2/2 - 1, x)`.

2. (10 points) Explain the behaviour of Maple when each of the following sequence of commands is issued:

   (a) `restart; e:= e+1; e;`

   (b) `restart; e:=5; e:= e+1; e;`

3. (10 points) We saw in class on Monday that `diff(x^2/2, x)` evaluates to `x` but `'diff(x^2/2, x)'` evaluates to `diff(x^2/2, x)`.

   You might expect `'2^2'` to evaluate to `2^2` but actually it evaluates to `4`. The reason is that Maple performs so-called **automatic simplification** of expressions and the right quotes do not suppress automatic simplification.

   Find as many other automatic simplifications performed by Maple as you can.

4. (10 points) How can you get Maple into a state into which there are two names `a` and `b` so that `a` names `b` and `b` names `a`? What happens in this situation when you evaluate `a`?

5. (10 points) Let $f(x) = x^x$.

   (a) Find an expression for the minimum value which f attains in the closed interval $[0, 1]$.

   (b) Evaluate the minimum value to an accuracy of 100 decimal places.