

Special Functions ¹

The antiderivatives of many elementary functions are not, themselves, elementary functions. Some of these antiderivatives arise frequently in certain subjects and have been given names. These are examples of what are called special functions, and other antiderivatives can sometimes be expressed in terms of these special functions.

Try the following MATLAB commands:

```
syms t
int(exp(-t^2))
int(sin(t^2))
```

Look up the definition of the special functions involved using the `mhhelp` command which calls up the help feature in the Maple kernel.

For the following find the general solution on the indicated interval, by hand, using the method of variation of parameters, except using MATLAB to integrate u'_1 and u'_2 .

Make sure you show all your work! Look up and write down, in standard mathematical notation, any special functions that occur and any unfamiliar expressions or constants that appear in these definitions.

(a) $y'' - 3y' = \frac{1}{t}, \quad t > 0$

(b) $y'' - 2y' + 2y = \frac{e^t}{t}, \quad t > 0$

¹Copyright ©2002 Steve Chapin and Larry Snyder. All rights reserved. Please address comments to young@math.ohiou.edu.