2E2 Tutorial Sheet 17 Second Term[1]

3 March 2004

1. (3) Assuming the solution of
$$y'' - 3x^2y = 0 \tag{1}$$
has a series expansion about $x = 0$ work out the recursion relation and write out the first four non-zero term s if $y(0) = 1$ and $y'(0) = 1$.

2. (2) Assuming the solution of
$$y' - 3xy = 2 \tag{2}$$
has a series expansion about $x = 0$, work out the recursion relation and write out the first four non-zero terms.

3. (3) Use the Method of Froebenius to find series solutions for
$$xy'' + 2y' + xy = 0 \tag{3}$$
about $x = 0$. Remember that to use the method of Froebenius you substitute
$$y = \sum_{n=0}^{\infty} a_n x^{n+r} \tag{4}$$
In this example you will find that there will only be one solution unless r is chosen to be zero or -1.

[1]Conor Houghton, `houghton@maths.tcd.ie` and `http://www.maths.tcd.ie/~houghton/ 2E2.html`