MTH 34, Homework 1 on sections 1.1, 1.2, 1.3, 2.1

Write all your working out and answers on your own notepaper - no need to write the questions. Please use lots of space.

It is very important that you show clearly any work you had to do to get your answers. Just writing the answer down with no work shown is usually not enough. The questions are worth 3 points each for a total of 30.

Try these questions from the textbook:

(1) Page 7, Question 3

(2) Page 9, Question 21

(3) Page 17, Question 12

(4) Page 24, Question 1

(5) Page 24, Question 2

(6) Page 24, Question 7

(7) Page 25, Question 25

(8) Page 40, Question 5

(9) Page 40, Question 9

(10) Page 40, Question 15

Homework should be handed in the week after it is assigned. Late homework will only receive partial credit.

If you understand the homework questions then you will be able to do the exam questions. You should also try the other questions listed on the syllabus to get extra practice. For any difficulties with the homework, please talk to me after class, come to my office hours or try the Math Tutorial Lab: CP 303.

Graphing slope fields (direction fields) is easiest on a computer. Slope fields are needed in questions **(1), (2), (8), (9)** of this homework set. See the next page for one way to do this.

For example, in **(8)** we are asked for the slope field of the differential equation

$$y' - 2y = 3e^t.$$

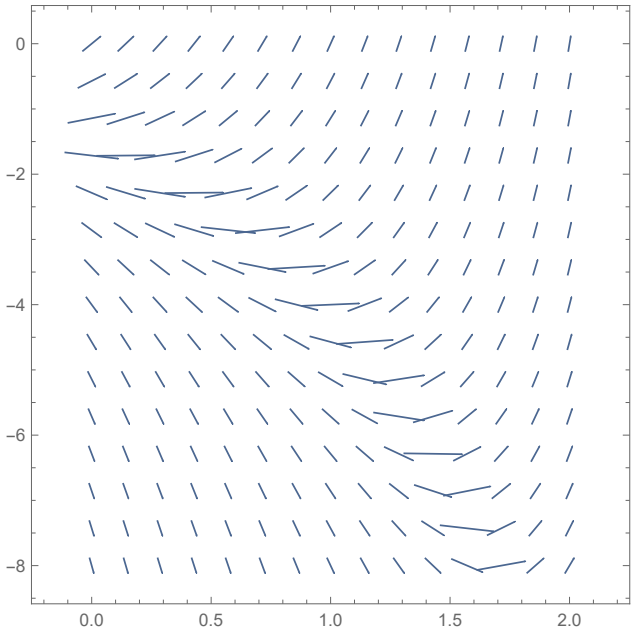
This means the slope is

$$y' = 2y + 3e^t$$

at the point (t, y) in the ty-plane. The *Mathematica* commands that produce the slope field are

```
f[t_, y_] := 2 y + 3 E^t;
VectorPlot[{1, f[t, y]}, {t, 0, 2}, {y, -8, 0},
   VectorScale -> {0.03, 0.03, None}]
```

It must be typed in exactly. Then hit Shift+Enter at the same time to get



which is the slope field for t between 0 and 2 and for y between -8 and 0. The solutions to the differential equation are curves where $y = y(t)$ is a function of t. You can see that if $y(0)$ is about -3 or more then the solution curve following the slopes will eventually go up. If $y(0)$ is less than -3 then the solution curve following the slopes will go down. So as $t \to \infty$ we see graphically that $y \to \infty$ in the first case and $y \to -\infty$ in the second.