

# CPIB SUMMER SCHOOL 2011: INTRODUCTION TO BIOLOGICAL MODELLING

## Graphs Quiz — September 2011

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Sketching certain graphs can be very helpful with analysing simple models, or parts of more complex models.

**Don't worry if you can't do these. We'll go over them anyway!**

The following are all written in the form  $y = f(x)$ . For example, in Q1,  $y = x(1 - x)$ , so  $f(x) = x(1 - x)$ .

To help sketch the graphs, it is useful consider:

- ▶  $f(0)$  (the value of  $y$  when  $x = 0$ ), where the graph crosses the vertical axis;
- ▶  $\frac{dy}{dx}(0) = f'(0)$ , the slope of the graph at  $x = 0$ ;
- ▶ any other obvious points where  $f(x) = 0$ ;
- ▶ where does the graph go when  $x$  gets very large? Does it go up, down, or become flat?

1. Sketch the graph of  $y = x(1 - x)$

2. Sketch the graph of  $y = x(1 - x)(x - 0.25)$

3. Sketch the graph of  $y = \frac{x}{1+x}$

4. Sketch the graph of  $y = \frac{x^2}{1+x^2}$