1. A certain sequence (b_n) satisfies the recursion

$$b_{n+1} = b_n^3 - b_n.$$

   Can this sequence have limit 6? What are the possible limits of this sequence, if any? State clearly which principle enters into play.

2. $y = f(x) = x(x - 3)$ is the equation of a parabola. Complete the square so as to put it in the form $y = (x - a)^2 + b$, and find, graphically, the image under f of the interval $[-2,2]$. Provide an explanation of the colour code.

3.

   (a) Find $\lim\limits_{x \to \infty} e^{-2\log x}$.

   (b) Find $\lim\limits_{x \to -\infty} \dfrac{x^2 - 3x + 1}{2 - x}$.

4. Plot the ceiling function $x \longmapsto \lceil x \rceil$. According to the definition (which you must state), is it right or left continuous at the integers?

5. Find the intercept of the tangent to the ellipse of equation

$$\frac{x^2}{9} + \frac{y^2}{4} = 1$$

   at the point $\left(-\sqrt{27}/2, 1\right)$, with the x-axis.

6. (pb 71 of § 4.4). Two people start walking from the same point. One walks west at 5 mph, the other south, at 6 mph. At what rate is the distance between them changing after 40 minutes?

7. Suppose that $f(2) = -4, g(2) = 3, f'(2) = 2, g'(2) = -1$. Find dy/dx for:

$$\text{(i) } y = \frac{f}{2g} \qquad\qquad \text{(ii) } y = \frac{f(x)}{x^2 + 1}.$$