10 The number, b, of bacteria in a sample is given by $b = P + Q\mathrm{e}^{2t}$, where P and Q are constants and t is time in weeks. Initially there are 500 bacteria which increase to 600 after 1 week.

(a) Find the value of P and of Q. [4]

(b) Find the number of bacteria present after 2 weeks. [1]

(c) Find the first week in which the number of bacteria is greater than 1 000 000. [3]

11 **(a)** Show that $\dfrac{\sin x \tan x}{1-\cos x} = 1 + \sec x$. [4]