Recurrence Relations

- 1. Find the next four terms and the limit, if it exists, for each recurrence relation.
 - a) $U_{n+1} = 0.1U_n + 4.5$, $U_0 = 4$ (3)
 - b) $U_{n+1} = -0.2U_n + 10, U_0 = 8$ (3)
- 2. It is estimated that the area of a pond affected by algae increases by 5 square metres each week. A gardener clears 25% of the affected area each week. If the original area affected by the algae was 30 square metres:
 - a) Write down a recurrence relation that describes the situation above.(2)
 - b) Find the limit and explain what it means in the context of the question.(3)
- 3. John's bank pays 6% compound interest per annum. He decides to invest £2000. If A_n is the amount after n years:

a)	Write down a recurrence relation.	(2)
b)	Calculate A_1 , A_2 and A_3 .	(2)
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- c) Write down a formula for A_n. (2)
- 4. Trees are sprayed weekly with the pesticide "Killpest", whose manufactors claim it will destroy 65% of all pests. Between the weekly sprayings, it is estimated that 500 new pests invade the tree. A new pesticide "Pestkill", comes onto the market. The manufactors claim it will destroy 85% of existing pests but it is estimated that 650 new pests per week will invade the trees.

Which pesticide will be more effective?(5)

5. The amounts in a bank account at the end of three consecutive years were £1500, £1675 and £1858.75 respectively. The interest rate remained constant over this period, while an extra fixed amount was also invested each year.

What was the interest rate and the amount invested each year? (5)

<u>Revision</u>

- 6. Triangle ABC has vertices A(-3,-3), B(-1,1) and C(7,-3).
 a) Show that triangle ABC is right-angled at B. (3)
 - b) The medians AD and BE intersect at M.
 - i) Find the equations of AD and BE. (6)
 - ii) Hence find the coordinates of M. (3)