Question 11 **(8 marks)**

Charles turns 60 years of age today. He has been saving for his retirement when he reaches 65 and currently has $465 000 to put toward this. His plan is to have an amount of $675 000 by the time he retires, and to set up a pension fund from which he can be paid an annuity each year.

(a) Charles invests his money in an account earning interest at the rate of 3.35% per annum, with interest calculated and added to his account at the end of each month. He also deposits an additional amount of money at the end of each month. Determine the monthly deposit required by Charles if he is to reach his goal by his 65th birthday.

(3 marks)

Assuming Charles successfully manages to save the $675 000 by his 65th birthday, he will set up his pension fund. It is anticipated that the fund will earn interest at the rate of 3.25% per annum, compounded monthly, and he will withdraw an annuity of $65 000 each year on his birthday.

(b) (i) Determine the number of years that he will be able to receive this annuity.

(3 marks)

(ii) Charles is hopeful that it will be possible for him to continue receiving an annuity until his 85th birthday. He decides to find an alternative fund offering a different interest rate, while continuing to withdraw $65 000 each year. What annual interest rate would he need to receive to make his money last until his 85th birthday? (2 marks)