Question 9 (12 marks) Use the Question 9 Writing Booklet.

(a) (i) When Chris started a new job, \$500 was deposited into his superannuation fund at the beginning of each month. The money was invested at 0.5% per month, compounded monthly. **2**

Let \$$P$ be the value of the investment after 240 months, when Chris retires.

Show that $P = 232\,175.55$.

(ii) After retirement, Chris withdraws \$2000 from the account at the end of each month, without making any further deposits. The account continues to earn interest at 0.5% per month.

Let \$$A_n$ be the amount left in the account n months after Chris's retirement.

(1) Show that $A_n = (P - 400\,000) \times 1.005^n + 400\,000$. **3**

(2) For how many months after retirement will there be money left in the account? **2**

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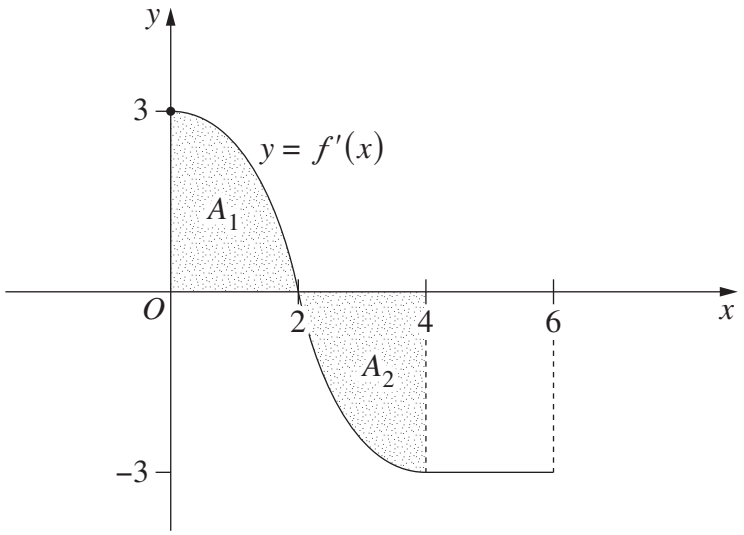
Question 9 (continued)

(b) Let $y = f(x)$ be a function defined for $0 \le x \le 6$, with $f(0) = 0$.

The diagram shows the graph of the derivative of f, $y = f'(x)$.



The shaded region A_1 has area 4 square units. The shaded region A_2 has area 4 square units.

(i) For which values of x is $f(x)$ increasing? **1**

(ii) What is the maximum value of $f(x)$? **1**

(iii) Find the value of $f(6)$. **1**

(iv) Draw a graph of $y = f(x)$ for $0 \le x \le 6$. **2**

End of Question 9