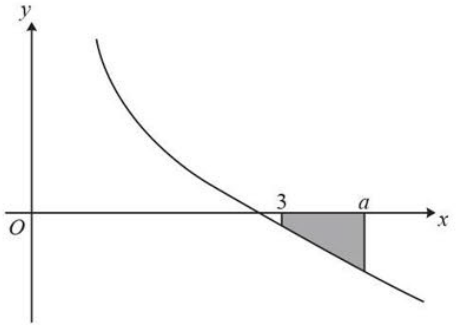
5



The diagram shows part of the graph of $y = \frac{1}{x^2} + \frac{11}{8} - \frac{1}{2}x$.

The shaded region is enclosed by the curve, the x-axis and the lines $x = 3$ and $x = a$, where $a > 3$.

The area of the shaded region is $\frac{7}{24}$ square units.

(a) Show that a satisfies the equation $2a^3 - 11a^2 + 10a + 8 = 0$. **[5]**

The cubic polynomial $2a^3 - 11a^2 + 10a + 8$ is denoted by $\mathrm{f}(a)$.

(b) Use the factor theorem to show that $(2a + 1)$ is a factor of $\mathrm{f}(a)$. **[2]**

(c) **In this question you must show detailed reasoning.**

By factorising $\mathrm{f}(a)$ completely, find the value of a. **[3]**