

Express the following in partial fractions.

$$\frac{x + 4}{(x + 1)(2 - x)}$$

Given that $y = 2$ when $x = 3$, solve the differential equation

$$\frac{dy}{dx} = \frac{y(x + 4)}{(x + 1)(2 - x)}$$

Given that $|x| < 1$, obtain the binomial expansions of the following, up to and including the term in x^2 .

$$(1 + x)^{-1} \quad (2 - x)^{-1}$$

Hence obtain the coefficient of x^2 in the expansion of

$$\frac{x + 4}{(x + 1)(2 - x)}$$

The function $f(x)$ is defined for all real values of x by

$$f(x) = \frac{x + 4}{(x + 1)(2 - x)}$$

State the greatest domain of $f(x)$.

Sketch the graph of $f(x)$, labelling all intercepts and asymptotes.

Use the trapezium rule with five strips of equal width, to estimate the value of

$$\int_0^1 \frac{x + 4}{(x + 1)(2 - x)} dx$$

Give your answer to 3 significant figures.