Work out the value of $x$.
Give your answer correct to 1 decimal place.

$\text{(Total for Question 16 is 3 marks)}$

17 $ABCD$ is a parallelogram.

$\overrightarrow{BC} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$  $\overrightarrow{DC} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$

Find $\overrightarrow{BD}$ as a column vector.

$\text{(Total for Question 17 is 2 marks)}$
(c) Use the graph to find estimates for the solutions of the equation \( x + \frac{9}{x} = 7 \)

(Total for Question 16 is 6 marks)

17. \( f(x) = \frac{3}{x + 1} + \frac{1}{x - 2} \)

(a) State one value of \( x \) which cannot be included in any domain of \( f \).

(b) Find the value of \( f(0) \)

(c) Find the value of \( x \) for which \( f(x) = 0 \)
   Show clear algebraic working.

\[ x = \]

(Total for Question 17 is 5 marks)
19 (a) Show that \((5 - \sqrt{8})(7 + \sqrt{2}) = 31 - 9\sqrt{2}\)

Show each stage of your working.

\[ \text{Given that } c \text{ is a prime number,} \]

(b) rationalise the denominator of \(\frac{3c - \sqrt{c}}{\sqrt{c}}\)

Simplify your answer.

(Total for Question 19 is 5 marks)
21 \( y = x^3 + 6x^2 + 5 \)

(a) Find \( \frac{dy}{dx} \)

\[ \frac{dy}{dx} = \] \hspace{1cm} (2)

The curve with equation \( y = x^3 + 6x^2 + 5 \) has two turning points.

(b) Work out the coordinates of these two turning points.
Show your working clearly.

(Total for Question 21 is 6 marks)
22  $A$, $r$ and $T$ are three variables.

$A$ is proportional to $T^2$
$A$ is also proportional to $r^3$

$T = 47$ when $r = 0.25$

Find $r$ when $T = 365$
Give your answer correct to 3 significant figures.

(Total for Question 22 is 4 marks)