Question 10 **(18 marks)**

Data concerning rental properties have been collected from 10 suburbs of a city. The data is for median property value (p) ($'000), median weekly rent ($\$w$) and percentage vacancy rate ($v\%$) within each suburb.

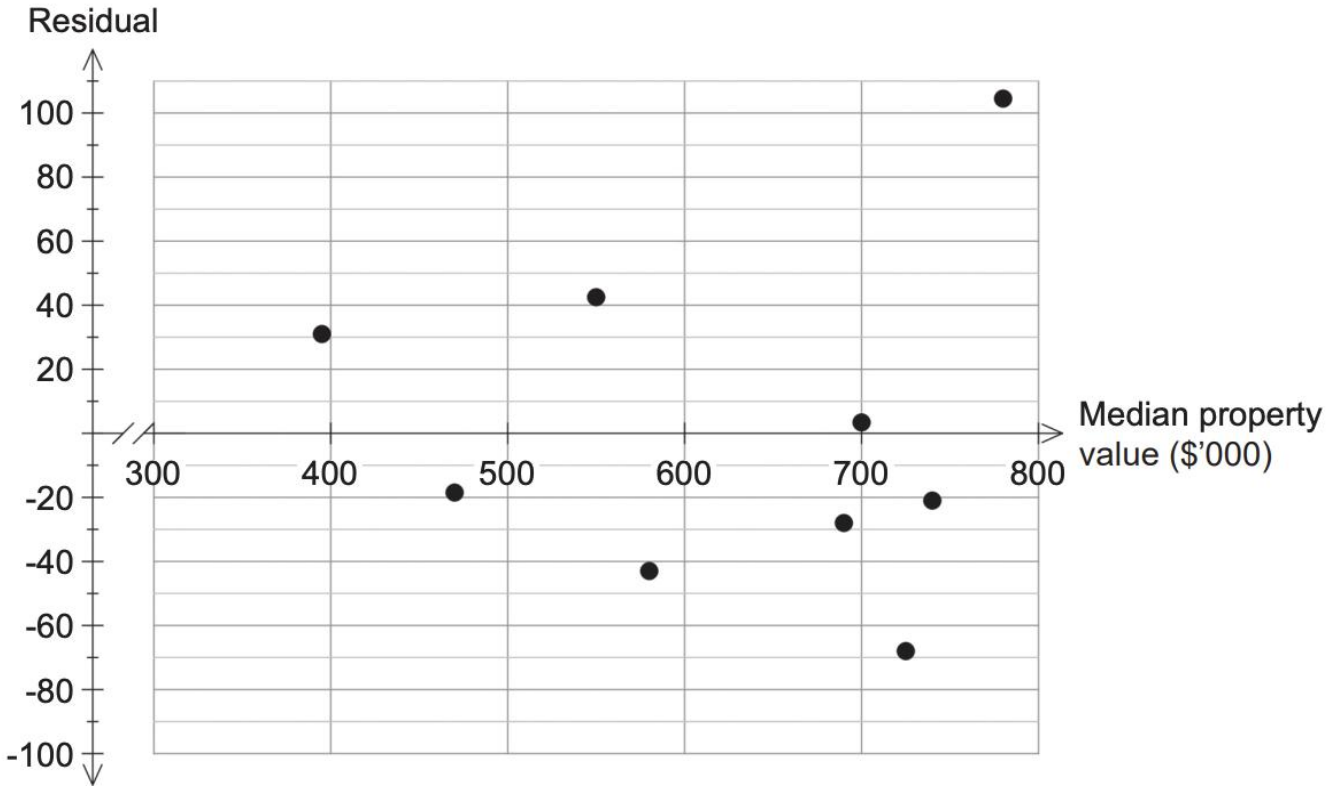
The data in the table below show the median property value and the median weekly rent for the 10 suburbs.

Median property value (p) ($'000)	395	470	550	725	580	780	700	740	690	585
Median weekly rent (w) ($)	445	460	590	630	530	850	680	690	640	575

(a) Calculate the correlation coefficient and the equation of the least-squares line for these data. (3 marks)

(b) In the context of this question, interpret the gradient of the least-squares line determined in part (a). (2 marks)

(c) The graph below shows the residual plot for the first nine suburbs as given in the table.
Determine the residual for the 10th suburb and plot this value on the graph. (2 marks)



(d) State a conclusion that can be drawn from the residual plot. (1 mark)

(e) The predicted weekly rent of a property was calculated to be \$612. What property value was this based on? (2 marks)

(f) If the data point (780, 850) was removed from all calculations, would the gradient of the least-squares line determined in part (a) increase, decrease or stay the same? (1 mark)

Bivariate data analysis between percentage vacancy rate and median weekly rent produced the following: $r_{vw}^2 = 0.85$ and $w = -82.64v + 940.64$.

(g) Explain why $r_{vw} = -0.92$. (2 marks)

(h) A property has a vacancy rate of 4.1% and a median property value of \$605 000. Predict the median weekly rent using the most reliable predictor. Justify which predictor is used. (2 marks)

(i) Calculate the expected change in the weekly rent if the percentage vacancy rate increases by 0.4%. (1 mark)

(j) Comment on the statement 'it is clear both property price and vacancy rate will cause changes to the median weekly rent'. Justify your answer. (2 marks)