



TAVUA COLLEGE

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WEEKLY HOME STUDY PACKAGE – WEEK 5 (02/08/21 – 06/08/21)

Subject	MATHEMATICS	YEAR/LEVEL	13
Strand	5 – LIMITS, CONTINUITY AND DIFFERENTIABILITY		
Sub – Strand	13.5.1 GRAPHS OF FUNCTIONS		
Content Learning Outcome	Explore the methods of finding Limits.		

Exercise Solutions:

1. Use *L' Hôpital's rule* to evaluate $\lim_{x \rightarrow 3} \frac{x^2-9}{x-3}$. (1 mark)

$$\begin{aligned}\lim_{x \rightarrow 3} \frac{x^2-9}{x-3} &= \lim_{x \rightarrow 3} \frac{2x}{1} && \text{(Differentiate numerator and denominator separately)} \\ &= 2 \times 3 && \text{Substitute } x = 3 \\ &= 6\end{aligned}$$

2. Evaluate $\lim_{x \rightarrow -1} \frac{3x^2-3}{x+1}$ using *algebraic manipulation*. (1½ marks)

$$\begin{aligned}&= \lim_{x \rightarrow -1} \frac{3(x-1)(x+1)}{x+1} \checkmark \\ &= 3(-1-1) \checkmark \\ &= \underline{-6} \checkmark\end{aligned}$$

3. Find *b* if $\lim_{x \rightarrow -1} \frac{2x-bx^2}{x+3x^3} = 2$ [hint: use direct substitution method] (2 marks)

$$\begin{aligned}\lim_{x \rightarrow -1} \frac{2x-bx^2}{x+3x^3} &= 2 \\ \frac{2(-1)-b(-1)^2}{(-1)+3(-1)^3} &= 2 \\ \frac{-2-b}{-1-3} &= 2 \\ \frac{-2-b}{-4} &= 2 \\ -2-b &= -8 \\ -b &= -8+2 \\ -b &= -6 \\ b &= 6\end{aligned}$$