

Very short answer questions

1. 2 marks Each part is worth 1 marks. Please write your answers in the boxes.

(a) Compute

$$\lim_{x \rightarrow +\infty} \frac{x^3 + 2x^2 - 1}{4x^3 + 3x + 5}.$$

Answer:

(b) Compute the derivative of $\left(\frac{x-2}{3x^2+x}\right)$

Answer:

Short answer questions — you must show your work

2. 4 marks Each part is worth 2 marks.

(a) Evaluate

$$\lim_{x \rightarrow -\infty} \frac{8x - 5}{\sqrt{4x^2 + x} - 6}.$$

(b) Find the equation of the tangent line to the graph of $y = x^3 - 2x^2 - 1$ at $x = 2$.

Long answer question — you must show your work

3. 4 marks Show that there exists at least one real number c such that $2 \cos\left(\frac{c}{2}\right) = \sin(c) - \frac{1}{c}$.