Very short answer questions

1. [2 marks] Each part is worth 1 marks. Please write your answers in the boxes.
   (a) Compute
   \[ \lim_{x \to +\infty} \frac{x^3 + 2x^2 - 1}{4x^3 + 3x + 5}. \]

   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
   \[ \lim_{x \to -\infty} \frac{8x - 5}{\sqrt{4x^2 + x - 6}}. \]

   (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 $2\cos\left(\frac{c}{2}\right) = \sin(c) - \frac{1}{c}$. 