Hand your completed quiz in before the due date. Do not forget to write down your name and student ID number. Marks will be awarded for this quiz based on the clarity of your answers. The marker will pay close attention to the logic of your answers. Please show all your working.

Q1. Sketch the graph of an example of a function $f$ that satisfies all of the given conditions.

(a) $\lim_{x \to 0^-} f(x) = -1$, $\lim_{x \to 0^+} f(x) = 2$, $f(0) = 1$.

(b) $\lim_{x \to 3^+} f(x) = 4$, $\lim_{x \to 3^-} f(x) = 2$, $\lim_{x \to -2} f(x) = 2$, $f(3) = 3$, $f(-2) = 1$.

Q2. Guess the value of the limit (if it exists) by evaluating the function at the given numbers (use your calculator).

(a) $\lim_{x \to 2} \frac{x^2 - 2x}{x^2 - x - 2}$, $x = 2.05, 2.01, 2.005, 1.9, 1.95, 1.99$.

(b) $\lim_{x \to -1} \frac{x^2 - 2x}{x^2 - x - 2}$, $x = -0.95, -0.99, -0.999, -1.1, -1.01, -1.001$.

(c) $\lim_{x \to 0} \frac{\sin(x)}{x + \tan(x)}$, $x = \pm 0.1, \pm 0.05, \pm 0.01$.

Q3. Given that $\lim_{x \to 2} f(x) = 4$, $\lim_{x \to 2} g(x) = -2$, $\lim_{x \to 2} h(x) = 0$ find the limits that exist. If the limit does not exist, explain why.

(a) $\lim_{x \to 2} [f(x) + 5g(x)]$.

(b) $\lim_{x \to 2} [g(x)]^3$.

(c) $\lim_{x \to 2} \sqrt{f(x)}$.

(d) $\lim_{x \to 2} \frac{g(x)}{h(x)}$.

(e) $\lim_{x \to 2} \frac{h(x)}{g(x)}$.

Q4. Evaluate the limit.

(a) $\lim_{x \to 3} (5x^3 - 3x^2 + x - 6)$.

(b) $\lim_{t \to -2} \frac{t^4 - 2}{t^2 - 3t + 2}$.

(c) $\lim_{\theta \to \pi/2} \theta \sin \theta$.

Q5. What is wrong with the following equation?

(a) $\frac{x^2 + x - 6}{x - 2} = x + 3$.

(b) In view of part (a), explain why the equation $\lim_{x \to 2} \frac{x^2 + x - 6}{x - 2} = \lim_{x \to 2} (x + 3)$ is correct.

Q6. Evaluate the limit if it exists.

(a) $\lim_{x \to 5} \frac{x^2 - 6x + 5}{x - 5}$.

(b) $\lim_{x \to -3} \frac{x^2 - 9}{2x^2 + 7x + 3}$.

(c) $\lim_{h \to 0} \frac{(2 + h)^3 - 8}{h}$.

(d) $\lim_{t \to -2} \frac{t^4 + 2}{t^4 + 8}$.

(e) $\lim_{x \to 16} \frac{4 - \sqrt{x}}{16x - x^2}$.