

1. Compute the following limits. Showing no work will receive **zero** points.

(a) (3 points) $\lim_{h \rightarrow 0} \frac{\sqrt{(2+h)^2 + 1} - \sqrt{5}}{h}$

(b) (3 points) $\lim_{x \rightarrow \infty} \frac{4x^3 + 5x^2}{\sqrt[3]{8x^9 + 3x}}$

2. (a) (1 point) Find a number c so that the function below is continuous for all x .

$$f(x) = \begin{cases} cx^2 + 1, & x < 1 \\ x^3 - 3, & x \geq 1 \end{cases}$$

- (b) (3 points) Recall that a function is continuous at $x = a$ if

- (i) a is in the domain
- (ii) $\lim_{x \rightarrow a} g(x) = g(a)$.

Explain why the c you found in Part (a) guarantees that f is continuous **for all** x .