MAT1001 Quiz 10 - Version 1
Time: 20 Minutes

Student Name: _____ Student ID: _____

1. [3+3 Points] Determine whether the following statements are true or not. No justification is needed.

   (a) For any nonzero real number a, the function $f(x) = x^a$ grows faster than $g(x) = \ln x$ as $x \to \infty$.

   (b) The function $f(x) = \ln x$ grows faster than $g(x) = (\log_{2048} x)/2048$ as $x \to \infty$.

2. [6 Points] Is the following statement true or false? Justify your answer.

   For all positive x, $\log_5(48) \cdot \log_{48}(x) = \log_5(x)$.

3. [6 Points] Explain geometrically why $e^x \geq x + 1$ must be true for all x. (*Hint.* Consider a tangent line.)

4. [6+6 Points] Evaluate the following limits:

(a) $\lim_{x \to 0} (1 - 5x)^{3/x}$.

(b) $\lim_{x \to \infty} \sqrt{x} e^{-x/2}$.