Solutions for Quiz #2  
Math 221

Instructions. Be sure to show your work and explain your reasoning for full credit.

1. Compute the limit
\[
\lim_{h \to 0} \frac{(2 + h)^2 - 4}{h}
\]

Solution:
\[
\lim_{h \to 0} \frac{(2 + h)^2 - 4}{h} = \lim_{h \to 0} \frac{4 + h^2 + 4h - 4}{h} = \lim_{h \to 0} \frac{h^2 + 4h}{h} = \lim_{h \to 0} \frac{h(4 + h)}{h} = 4.
\]

2. If \( \frac{x^2 - 5x + 6}{x - 2} \leq g(x) \leq x^2 - 3x + 1 \) for all \( x \), determine \( \lim_{x \to 2} g(x) \). Be sure to justify your answer. The following graphs of the two bounding functions may help suggest something.

Solution:
\[
\lim_{x \to 2} \frac{x^2 - 5x + 6}{x - 2} = \lim_{x \to 2} \frac{(x - 2)(x - 3)}{x - 2} = \lim_{x \to 2} (x - 3) = -1.
\]

And \( \lim_{x \to 2} (x^2 - 3x + 1) = -1 \). Therefore, by Squeeze (Sandwich) Theorem,
\[
\lim_{x \to 2} g(x) = -1.
\]