Written HW4 – MATH 2501 Fall 2020

Due by Thursday, 30 August for timely completion credit

Squeeze theorem: If for all x near a, the inequality $g(x) \leq f(x) \leq h(x)$ holds and $\lim_{x \to a} g(x) = \lim_{x \to a} h(x) = L$, then $\lim_{x \to a} f(x) = L$.

This theorem is useful when f is a complicated function, but you can find a g and h that are not so complicated. For full credit, clearly show how you are verifying the two conditions of the squeeze theorem and state "by the squeeze theorem" before you arrive at your conclusion.

1. Suppose you knew that for some unknown function $f(x)$ that whenever x is 1,
$$-4x \leq f(x) \leq x^2 - 6x + 1.$$
Use the squeeze theorem to determine $\lim_{x \to 1} f(x)$.

2. Recall that $-1 \leq \sin(x) \leq 1$. Use the squeeze theorem to evaluate
$$\lim_{x \to 0} x^2 \sin\left(\frac{6}{x}\right).$$
Include in your response a picture of this graph (using Demos) near $x = 0$.

3. Use the squeeze theorem to calculuate
$$\lim_{x \to 2} (x-2) \sin\left(\cos\left(\frac{1}{x-2}\right)\right).$$
Include in your response a picture of this graph (using Demos) near $x = 2$.