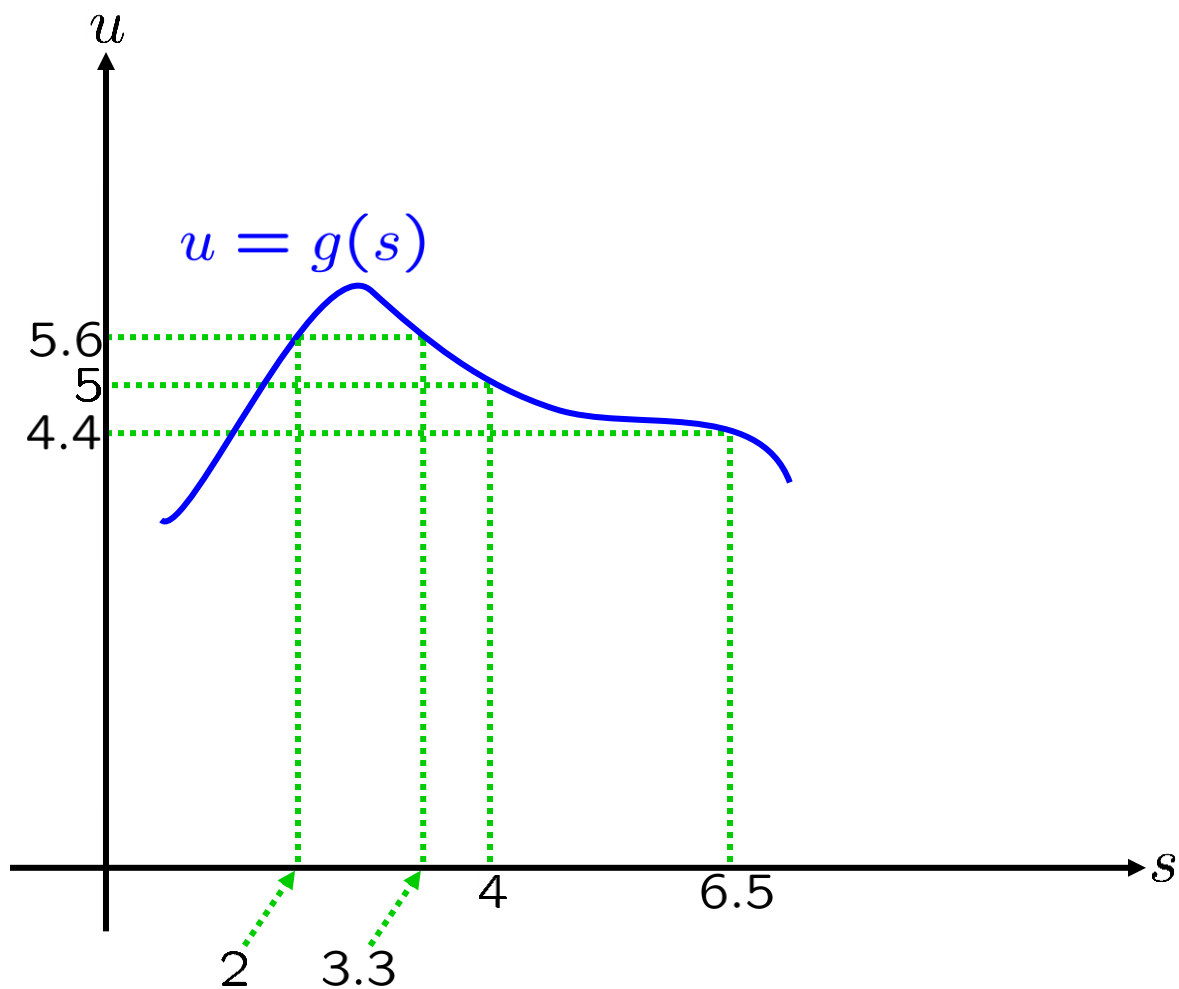


CALCULUS
The limit game and
the exact definition of a limit
NEW

0150-1. For the function g graphed below, what is the largest number δ such that

$$|s - 4| < \delta \Rightarrow |(g(s)) - 5| < 0.6 \quad ?$$



NEW 0150-2. Let $f(x) = -3x + 4$.

Show a graph of $y = f(x)$ that includes the points $(1, 1)$, $(2, -2)$ and $(3, -5)$.

Find the largest number δ such that

$$|x - 2| < \delta \Rightarrow |(f(x)) - (-2)| < 0.6.$$

NEW 0150-3. Let $g(x) = [-3x + 4] \left[\frac{x - 2}{x - 2} \right]$.

Show a graph of $y = g(x)$ that includes the points $(1, 1)$ and $(3, -5)$.

Find the largest number δ such that

$$0 < |x - 2| < \delta \Rightarrow |(g(x)) - (-2)| < 0.6.$$

^{NEW}0150-4. In shop class, you are asked to build a disk-shaped sheet of metal of area 16π square inches.

The area can be slightly off, but must be between $16\pi - (0.1)$ and $16\pi + (0.1)$ inches².

Say you have access to a machine that will punch out a perfect disk, and the diameter (in inches) is controlled by a dial.

How close to 8 must you set the dial to get the area to be in the specified range?

Give your answer to five decimal places.

0150-5. **NEW** Prove that $\lim_{x \rightarrow 0} (2x^2/x) = 0$.

Your writeup should read:

Given $\varepsilon > 0$.

Let $\delta = \dots$.

Assume $0 < |x - 0| < \delta$.

Then $x \neq 0$ and $|2x - 0| < 2\delta$.

Then $|(2x^2/x) - 0| < 2\delta$. ←-----penultimate sentence

Then $|(2x^2/x) - 0| < \varepsilon$. ←-----last sentence

All you need do is fill in the ellipsis (\dots) with a carefully chosen expression of ε .

Hint: The last sentence in the writeup clearly follows from the penultimate sentence if $2\delta = \varepsilon$.