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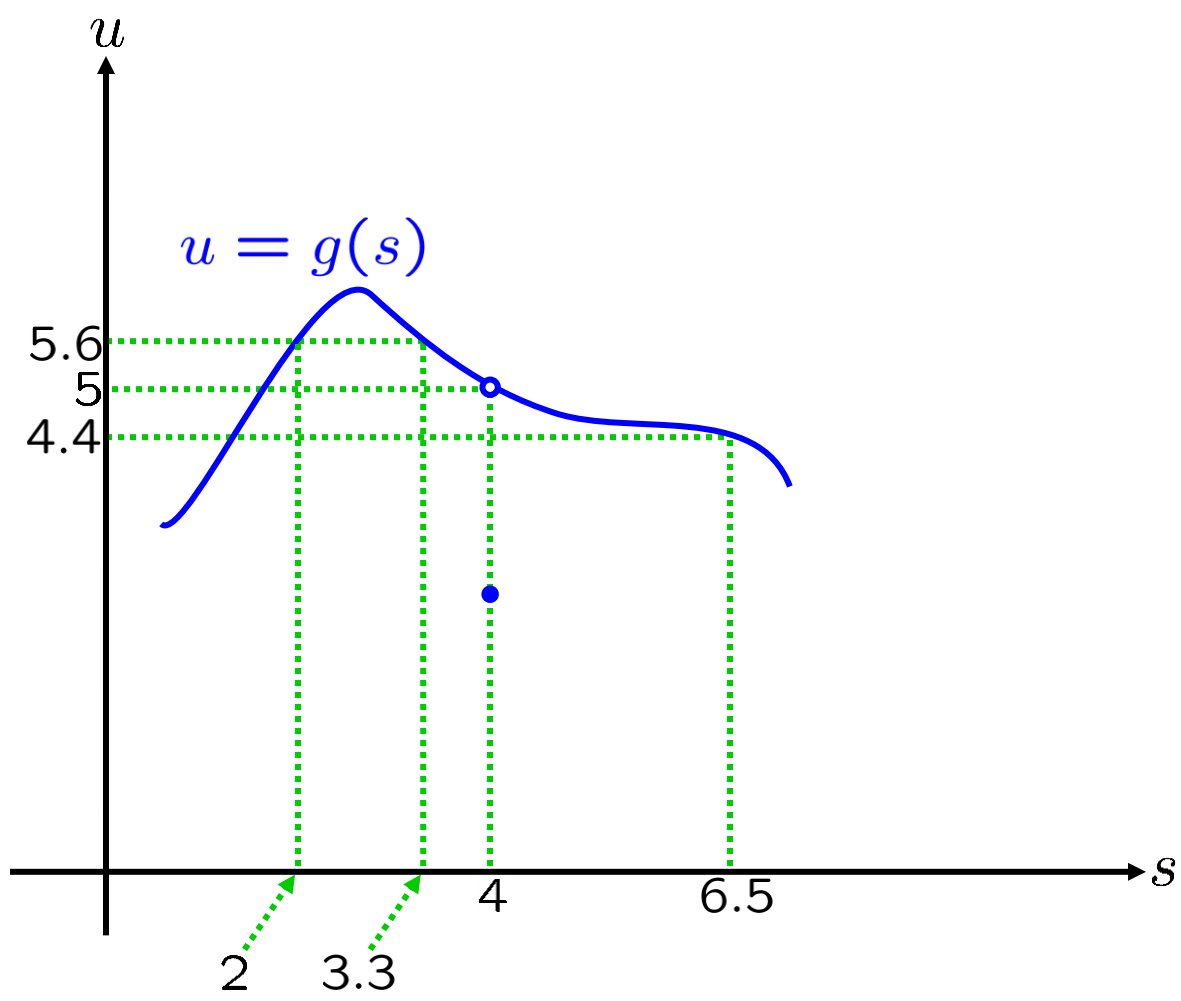## The limit game and
the exact definition of a limit
NEW

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

$$0 < |s - 4| < \delta \quad \Rightarrow \quad |(g(s)) - 5| < 0.6 \quad ?$$

u

$u = g(s)$

5.6
5
4.4

2   3.3

4   6.5

s

2

0150-2. Let $f(x) = -2x + 8$.

Show a graph of $y = f(x)$ that includes the points $(2, 4)$, $(3, 2)$ and $(4, 0)$.

Find the largest number δ such that
$$|x - 3| < \delta \quad \Rightarrow \quad |(f(x)) - 2| < 0.6.$$

0150-3. Let $g(x) = [-2x + 8] \left[\dfrac{x - 3}{x - 3} \right]$.

Show a graph of $y = g(x)$ that includes the points $(2, 4)$ and $(4, 0)$.

Find the largest number δ such that
$$0 < |x - 3| < \delta \quad \Rightarrow \quad |(g(x)) - 2| < 0.6.$$

In shop class, you are asked to build a square sheet of metal of area

169 square inches.

The area can be slightly off, but must be between 164 and 174 square inches.

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

How close to 13 must you set the dial to get the area to be in the specified range?

Give your answer to five decimal places.

Prove that $\lim\limits_{x \to 6} -4x = -24$.

Your writeup should read:

> Given $\varepsilon > 0$.
> Let $\delta = \cdots$.
> Assume $0 < |x - 6| < \delta$.
> Then $|(-4x) - (-24)| < 4\delta$. $\longleftarrow$ penultimate sentence
> Then $|(-4x) - (-24)| < \varepsilon$. $\longleftarrow$ last sentence

All you need do is fill in the ellipsis $(\cdots)$ with
a carefully chosen expression of ε.
Hint: The last sentence in the writeup clearly
follows from the penultimate sentence
if $4\delta = \varepsilon$.