

Problem 1:

| | | | | | |
|------|----------|-----------|------------|-------------|---------------|
| T: | 2.25 | 2.25, 2.5 | 2.4, 2.5 | 2.49, 2.5 | 2.4999, 2.5 |
| A.V: | -72 ft/s | -76 ft/s | -78.4 ft/s | -79.84 ft/s | -79.9984 ft/s |

The ball would hit at $80 \frac{\text{ft}}{\text{sec}}$. The table keeps getting closer to 80 as we moved on.

The answer 2.5 sec came from these steps

$$0 = 100 - 16t^2 \quad t = \sqrt{\frac{100}{16}}$$
$$16t^2 = 100 \quad t = \frac{10}{4}$$
$$t^2 = \frac{100}{16} \quad t = 2.5 \text{ sec}$$

Another (same idea):

$[2.25, 2.5] v = -76 \text{ ft/s}$
 $[2.4, 2.5] v = -78.4 \text{ ft/s}$
 $[2.49, 2.5] v = -79.84 \text{ ft/s}$
 $[2.4999, 2.5] v = -79.9984 \text{ ft/s}$

The ball is traveling the fastest at 80 ft/s

Problem 2:

Handwritten work on a whiteboard showing a table of $f(n)$ values and a sum calculation. The table is:

| n | 1 | 2 | 3 | 4 | 5 |
|--------|---------------|---------------|---------------|-----------------|-----------------|
| $f(n)$ | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{7}{8}$ | $\frac{15}{16}$ | $\frac{31}{32}$ |

Below the table, the sum is calculated:

$$f(5) = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} = \frac{31}{32}$$

An arrow points from the sum to the $f(5)$ entry in the table. Below the sum, the limit is written:

$$\lim_{n \rightarrow \infty} f(n) = 1$$

Note: The $f(5)$ expression should also include $1/32$ in the sum (it is missing in the above photo).

Another:

Handwritten work on a whiteboard showing a table of $f(n)$ values and their decimal equivalents. The table is:

| n | 1 | 2 | 3 | 4 | 5 |
|--------|---------------|---------------|---------------|-----------------|-----------------|
| $f(n)$ | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{7}{8}$ | $\frac{15}{16}$ | $\frac{31}{32}$ |
| | .5 | .75 | .875 | .9375 | .96875 |

Below the table, the limit is written and boxed:

$$\lim_{n \rightarrow \infty} f(n) = 1$$

Problem 3 (CN Tower):

$$D(t) = 4.9t^2$$

$$\frac{D(3) - D(2.999)}{3 - 2.999} = 29.4$$

$$\frac{D(3.001) - D(3)}{3.001 - 3} = 29.40$$

} 29.4