E: Levelized cost

Sequence of **hypothetical identical annual costs** having the **same PV** as a stream of **actual costs**

Also known as "annualized cost"

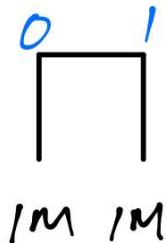Example: levelized cost of an infrastructure project

Bridge with **20 year** lifespan
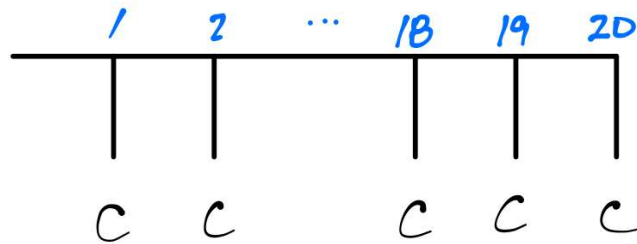Construction cost = **$1M** in each of years **0** and **1**
Useful life = years **1-20**
r = **10%**

PV of actual cost:

$$PV_{actual} = \$1M + \frac{\$1M}{1.1} = \$1.909M$$

PV of levelized cost during useful life:

$$PV_{level} = \frac{C}{r}\left(1 - \frac{1}{(1+r)^T}\right) = \frac{C}{0.1}\left(1 - \frac{1}{(1.1)^{20}}\right)$$

Solve for C that makes $PV_{level} = PV_{actual}$

$$\frac{C}{0.1}\left(1 - \frac{1}{(1.1)^{20}}\right) = 1.909M$$

$$\frac{C}{0.1} * 0.851 = 1.909M$$

$$C = \$224k$$

Typical uses:

- **Annual tolls** needed to pay for building the bridge
- **Annual benefits** that would be needed for breakeven NPV

General formula for levelized cost of PV:

$$C = \frac{r * PV}{\left(1 - \frac{1}{(1+r)^T}\right)}$$

Exercise on GC