Tricky Annuities

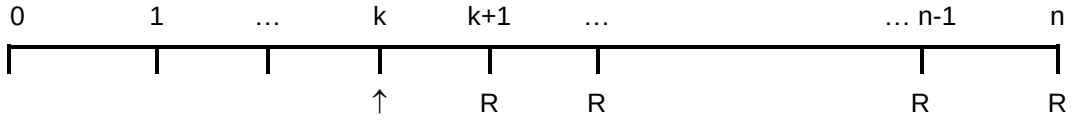
Date:

"It's all about drawing a timeline and using basic formulas."

- An **ordinary annuity** – our usual annuities; compounding periods match payment periods and all payments are the same
- A **general annuity** – when interest periods and payment intervals do not coincide; convert interest *i*, to match payments, *R*.
  Mortgages are the most typical example, usually converting semi-annual compounding to match monthly payments
- **Annuity due** – periodic payments fall at the beginning of a payment period
  ex. rent (no new formula(s) needed; draw a timeline and use the usual formulas)

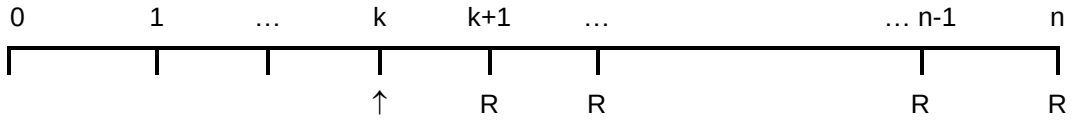
- **Deferred annuity** – the first payment is made at some time later than the first interest period.
  ex. "don't pay a cent until January 1st of next year!"
  Typically, deferred annuities are handled two ways:

  i) Determine PV_1, then move it backwards on the timeline, $PV = PV_1(1+i)^{-n}$



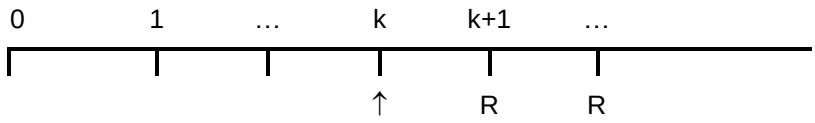
PV=$$$ PV_1 =?

  ii) Determine the future value, *A*, at time *k*. *A* is the present value for an ordinary annuity; solve for *R*.



PV=$$$ *A* =?

- **Perpetuity** – an annuity whose payments begin on a fixed date and continue forever; the compound interest earned in one period must be ≥ the payment.
  There is no meaning as the amount, or future value, but there is definitely a present value; (draw a timeline and solve as a ∞ geometric series)



PV=$$$ PV_1 =?