basic discounting formula: $PV = \frac{FV}{(1 + r)^t}$
perpetual annuity of $pmt/year: PV = \frac{pmt}{r}$

Calculate the $FV$ of $PV = $100 invested for $t = 10$ years at annual growth rate
\[
\begin{align*}
r &= 0.03 \\
r &= 0.06 \\
r &= 0.1 \\
\end{align*}
\]

Calculate the $PV$ of $FV = $1 million discounted at rate $r = 0.06$ to be received
\[
\begin{align*}
t &= 5 \text{ years from now} \\
t &= 10 \text{ years from now} \\
t &= 20 \text{ years from now} \\
\end{align*}
\]

Calculate the implicit rate of return $r$ on a $PV = $1 million investment that yields $FV = $2 million
\[
\begin{align*}
t &= 8 \text{ years from now} \\
t &= 9 \text{ years from now} \\
t &= 12 \text{ years from now} \\
\end{align*}
\]

Calculate how many years $t$ are required to increase your $PV$ by 50% at annual growth rate
\[
\begin{align*}
r &= 0.04 \\
r &= 0.07 \\
r &= 0.1 \\
\end{align*}
\]

A sewage treatment facility will cost $2 million to build and $100,000/year to operate over a 50-year lifespan. The environmental benefits will be $200,000/year over the facility’s lifespan. How do you decide if this facility should be built?

A new scrubber on a coal-fired power plant will cost $600,000 today and has a 5-year lifespan. It will cut the plant’s $SO_2$ emissions by 400 tons/year starting next year. The plant is currently paying $200/ton in the market for $SO_2$ emissions permits but expects the price of permits to rise 20% each year. Should the plant install the scrubber or keep buying 400 $SO_2$ permits for 5 more years?

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