\[
\text{duration} = -\frac{1}{y} \frac{dP}{dy} = \frac{-dP/P}{dy}
\]

Motivation: Being $1000 in bond portfolio.
By duration, yield of 3%.

What if yield/interest rates go down? (bond goes up)
\(\rightarrow NPV/price \uparrow\)

if yield goes to 2%:
\[ dy = -1\% \]
\[ \frac{dP}{P} = -\text{duration}, dy = +3\% \]
\(\Rightarrow\) net gain of $30, value goes to $1030

Zero coupon bond:
sense of size duration of maturity in
zero coupon bond duration is \(m\)

\[
\begin{align*}
\text{duration} &\leq 10 \\
\text{between } m, 2m \\
\text{...} \\
1 &\quad 7 \quad 8 \quad 9 \quad 10
\end{align*}
\]