- What is the probability that we get three heads at exactly five flips?
- $\mathbb{P}(X = 5) = ?$
- Note that $\mathbb{P}(X = 5)$ is the coefficient of t^5 in the formula

$$G_X(t) = \left(\frac{t}{2-t}\right)^3,$$

- which is the coefficient of t^2 in $f(t) = (2-t)^{-3}$.

Taylor series!

- If $f(t)$ is any function written as a power series, then the coefficient of t^2 is exactly $f''(0)/2$;
- and if $f(t) = (2-t)^{-3}$, then

$$f''(t) = 12(2-t)^{-5}$$

so

$$\frac{f''(0)}{2} = \frac{12}{2 \cdot 32} = \frac{3}{16}.$$