SPAB assignment 04

Task 2

$n = 100 \cdot 100 \cdot 230 \cdot 15 = 3{,}45 \cdot 10^7$ number of commits

$m = 2^{160}$ number of possible commit hashes

→ 2 commits with same hash is a birthday problem (2 people with same birthday)

→ $p = \prod_{i=0}^{n-1} \frac{m-i}{m} = \frac{m^n}{m^n} \approx \exp(-\frac{n^2}{2m}) = \exp(-\frac{(3{,}45 \cdot 10^7)^2}{2 \cdot 2^{160}})$

↑ approximation for large m and small n

$= \exp(-\frac{(3{,}45 \cdot 10^7)^2}{2^{161}}) \approx 1$

$n = 1000 \cdot 1000 \cdot 365 \cdot 100 = 3{,}65 \cdot 10^{10}$ number of commits

$p = \prod_{i=0}^{n-1} \frac{m-i}{m} = \frac{m^n}{m^n} \approx \exp(-\frac{n^2}{2m}) = \exp(-\frac{(3{,}65 \cdot 10^{10})^2}{2^{161}}) \approx 1$