# Simulating stock prices

## Digital tools for Finance - 2020

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# Simulation model

Some definitions:

- Geometric Brownian Motion

$$dS_t = \mu S_t\, dt + \sigma S_t\, dW_t$$

- Solution to SDE

$$S_t = S_0 \exp\left(\left(\mu - \frac{\sigma^2}{2}\right) t + \sigma W_t\right)$$

where $W_t$ is a Wiener process or Brownian motion, and $\mu$ (the percentage drift) and $\sigma$ (the percentage volatility), arbitrary initial value $S_0$ are constants.
For this presentation we use the following parameters:

| | $\mu$ | $\sigma$ |
|---|---|---|
| **Tyrell** | 0.02 | 0.2 |
| **Cyberdyne** | 0.03 | 0.25 |

# Results

- The empirical distribution follow the expected behaviour
- Cyberdyne, with a higher variance, shows higher probability of more extreme price movements.

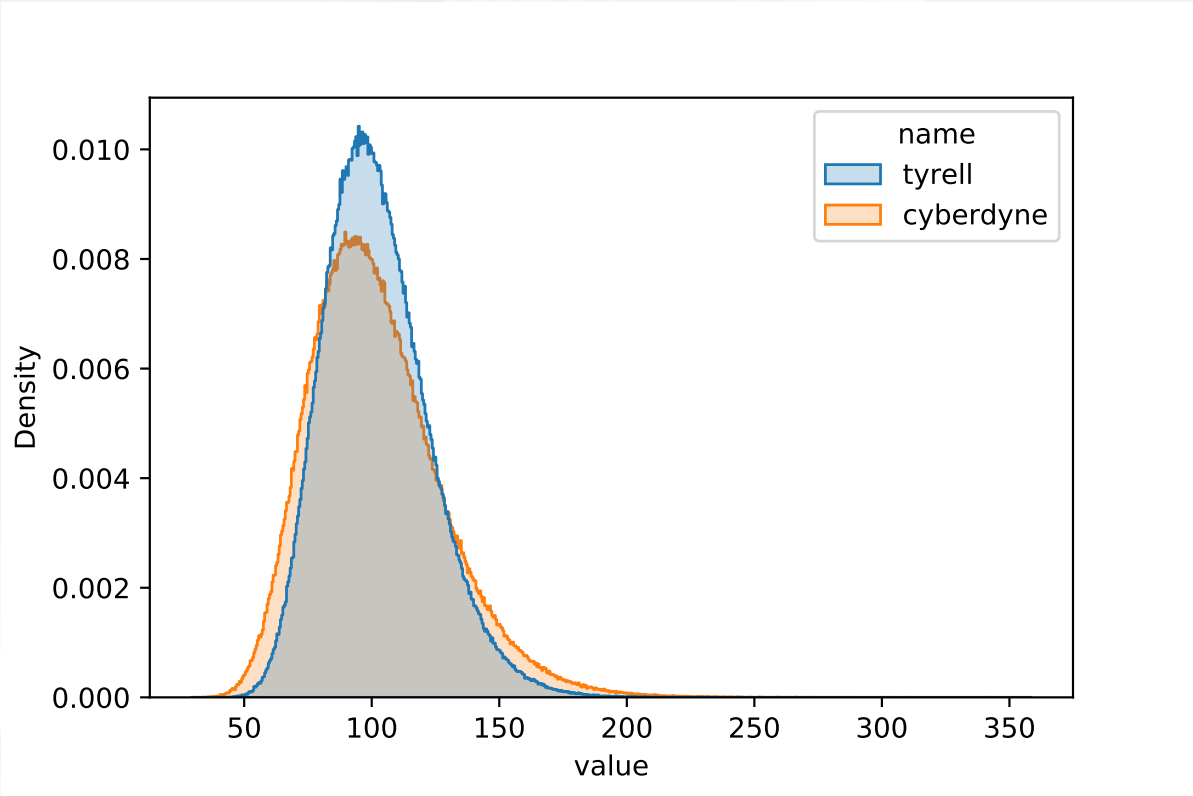


Figure: Distribution of stock prices at $t = 10$