SysID Lab 1: (Re)introduction to Matlab. Using the DC motor

Follow the Matlab tutorial indicated by the teaching assistant, and then read the DC motor usage guide linked from the website. Once that is done:

- Connect the motor to the computer using USB, make sure the system is plugged in, and configure it per the guide.
- Generate a vector of integer values *k* between 1 and 150 (discrete time steps).
- Compute a vector of corresponding input values *u*, where:

$$u_k = \begin{cases} 1, & k = 20 \\ 0, & \text{otherwise} \end{cases}$$

- Obtain the DC motor's response to the input signal *u* by calling:

```
y = DCMRun.run(u)
```

- Plot the response *y*.
- Compute from *y* a new signal *h* which is zero in steady-state and only contains the exponentially decreasing range. So:

$$h_k = y_{k+20} - y_{ss}$$

  where you read y_{ss} directly on the graph. Question: what is signal *h* called?

- We will approximate *h* with signal *x* so that $x_k = \alpha \cdot \exp(-\beta k)$. For any given values of α, β, plot *x* and *h* in the same figure.
- Tune α and β manually so that the two signals match as closely as possible.

If everything worked correctly, you should obtain a graph similar to the following: