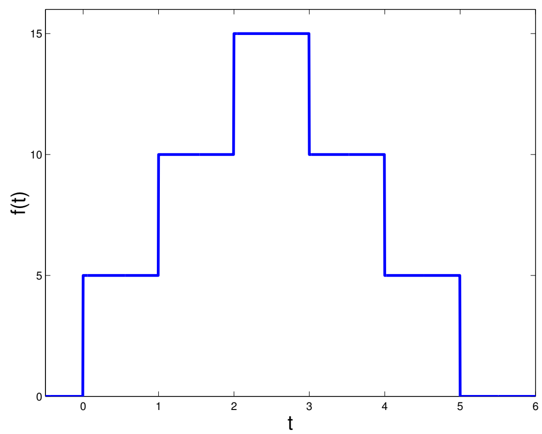
MTH 330 **Quiz #4** March 6, 2020

NAME: ____



1. Writing the forcing function, $f(t)$, shown in the graph above in terms of Heaveside step functions, $H(t)$.

   Then write down the Laplace transform $\mathcal{L}\left[f(t)\right](s)$, of this function.

2. Find the function $f(t)$ that satisfies:

$$f(t) = \mathcal{L}^{-1}\left[\frac{se^{-9s}}{s^2 + 8s + 52}\right](t)$$

3. Use Laplace Transform techniques to solve the following IVP:

$$y'' + 4y' + 20y = 1; \;\; y(0) = 0, \; y'(0) = 0$$

Extra Credit: Use your answer to write down the solution to:

$$y'' + 4y' + 20y = f(t); \;\; y(0) = 0, \; y'(0) = 0$$

where $f(t)$ is the forcing function shown in problem #1.

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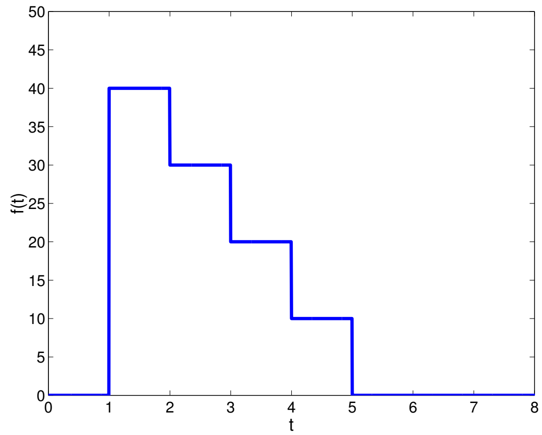

1. Writing the forcing function, $f(t)$, shown in the graph above in terms of Heaveside step functions, $H(t)$.

   Then write down the Laplace transform $\mathcal{L}\left[f(t)\right](s)$, of this function.

2. Find the function $f(t)$ that satisfies:

$$f(t) = \mathcal{L}^{-1}\left[\frac{se^{-3s}}{s^2 + 2s + 401}\right](t)$$

3. Use Laplace Transform techniques to solve the following IVP:

$$y'' + 6y' + 73y = 1; \;\; y(0) = 0, \; y'(0) = 0$$

Extra Credit: Use your answer to write down the solution to:

$$y'' + 6y' + 73y = f(t); \;\; y(0) = 0, \; y'(0) = 0$$

where $f(t)$ is the forcing function shown in problem #1.

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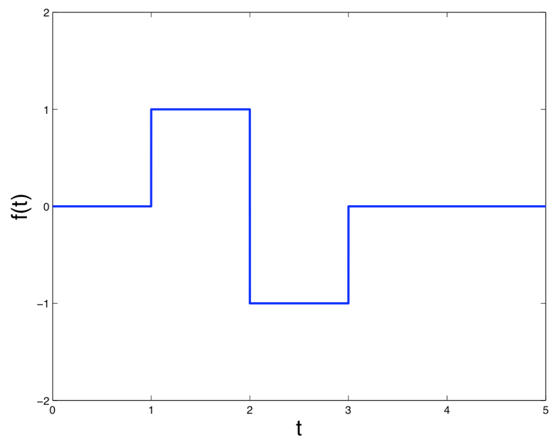

1. Writing the forcing function, $f(t)$, shown in the graph above in terms of Heaveside step functions, $H(t)$.

   Then write down the Laplace transform $\mathcal{L}\left[f(t)\right](s)$, of this function.

2. Find the function $f(t)$ that satisfies:

$$f(t) = \mathcal{L}^{-1}\left[\frac{se^{-\pi s}}{s^2 + 8s + 97}\right](t)$$

3. Use Laplace Transform techniques to solve the following IVP:

$$y'' + 10y' + 125y = 1; \;\; y(0) = 0, \; y'(0) = 0$$

Extra Credit: Use your answer to write down the solution to:

$$y'' + 10y' + 125y = f(t); \;\; y(0) = 0, \; y'(0) = 0$$

where $f(t)$ is the forcing function shown in problem #1.