1. Given the following signals \( g(t) \) and \( z(t) \), sketch \( g(3t) \) and \( z(t/2) \)

![Graphs of g(t) and z(t)]

2. Write the following signal in terms of singularity functions

3. For the system shown in the figure
   a. Find the differential equation relating the output, \( y(t) \), to the input \( x(t) \).
   b. What is the order of the system?
   c. Is the system fixed or time varying (Why)?
   d. Find the impulse response of the system?
   e. Find the step response of the system?

4. The impulse response of a system is \( h(t) = 4e^{-3t}u(t) \). Use convolution to determine the output when the input \( x(t) \) is (a) \( 2e^{-3t}u(t) \) and (b) \( 2e^{-5t}u(t) \).
   **Answer:** (a) \( 4e^{-3t} - 4e^{-5t}u(t) \), (b) \( 8e^{-5t}u(t) \)

5. Find the trigonometric Fourier series for the exponential \( e^{-t/2} \) shown in the figure over the interval \( 0 \leq t \leq \pi \)

   \[
   \varphi(t) = 0.504\left[1 + \sum_{n=1}^{\infty} \frac{2}{1+16n^2}(\cos 2nt + 4n \sin 2nt)\right]
   \]

6. Find the exponential Fourier series for the signal shown above.
   **Answer:** \( \varphi(t) = 0.504 \sum_{n=-\infty}^{\infty} \frac{1}{1 + j4n} e^{j2nt} \)

7. Sketch the spectrum of the signal above.

8. What is the percentage of power up to the third harmonics?

Regular moderate exercise will boost your energy, clear your mind and reduce any feelings of stress.