EECS 360
Homework #2

1. Section 2.5 Participation activities
- 2.5.1: Formation of unit step function.
- 2.5.2: Unit step function.
- 2.5.4: Ramp function.
- 2.5.5: Triangle waveform synthesized from ramps.
- 2.5.6: Rectangular (rect) function.
- 2.5.8: Impulse function.
- 2.5.9: Sampling property of the impulse function.
- 2.5.10: Time-scaling of impulse function sampling integrals.
- 2.5.11: Exponential function.
- 2.5.12: Exponential functions.

2. Challenge activity
2.5.1: Nonperiodic waveforms 3.

3. Exercise 2.5.3

4. Exercise 2.5.4

5. Exercise 2.5.12

6. Plot and compare these three signals. Explain their similarities and differences.
$x_1(t)= 5\cos(2\pi 50t)$, $x_2(t)= 5\cos\left(2\pi 50\left(t-\frac{1}{300}\right)\right)$, $x_3(t)= 5\cos\left(2\pi 50t-\frac{\pi}{3}\right)$

7. Let

$$x(t)=\sum_{i=-n}^{n} 4\,\mathrm{tri}\left(\frac{t-i}{.25}\right)$$

a. For n=2 plot x(t)
b. Sketch x(t) as n⟶∞, in this case is x(t) periodic, if so what is the period.

8. Plot

$$x(t)=1+\frac{1}{2}\sum_{n=1}^{5}\frac{4}{n\pi}\sin(2\pi nt)\quad \text{for } -3<t<3$$

9. A Binary Phase Keyed (BPSK) modulation is used to modulate binary information onto a radio frequency (RF) carrier. Given a set of information bits b_i = {-1, 1, -1, 1}. a. Plot x(t) the modulated BSPK RF signal given as

$$x(t)=\sum_{n=1}^{4} b_n\,\mathrm{rect}(t-n+0.5)\cos(2\pi 12t)$$

b. Repeat for b_i = {1, 0, 1, 0} (This an example of modulation using amplitude shift keying-ASK).

10. Solve the following.

a. $\int_{-\infty}^{\infty}\delta(\tau)\,e^{-2\tau}\,d\tau$

b. $\int_{-\infty}^{\infty}\delta(\tau-0.3)\,u(t)\,e^{-2\tau}\,d\tau$

c. $\int_{-\infty}^{\infty}\delta(\tau-.75)\,u(t)\,e^{-2\tau}\,d\tau$

d. $\int_{-\infty}^{\infty}\delta(\tau-t)\,u(t)\,e^{-2\tau}\,d\tau$