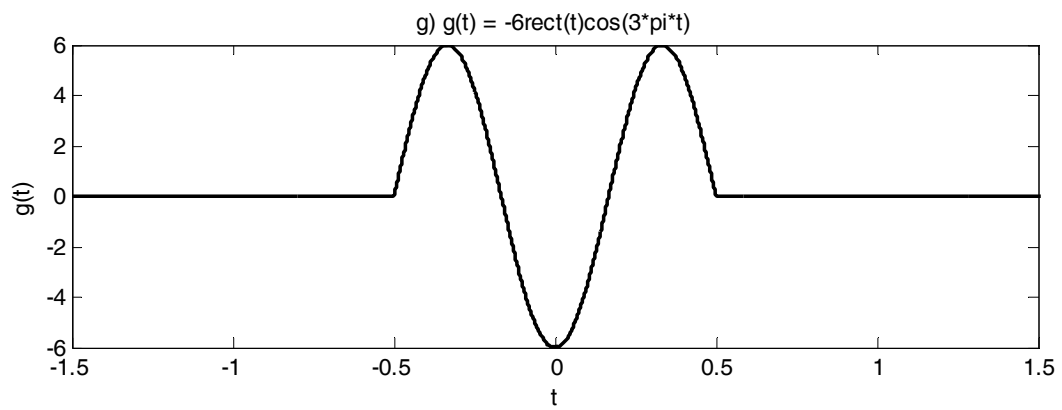
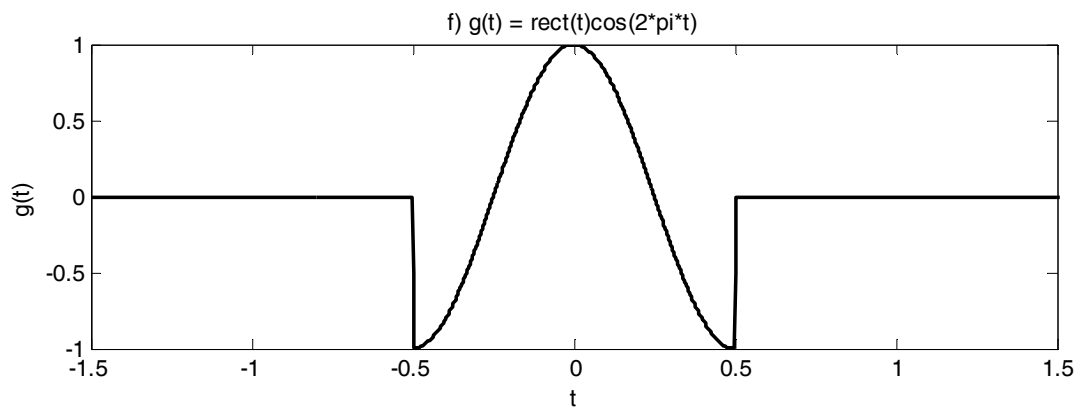
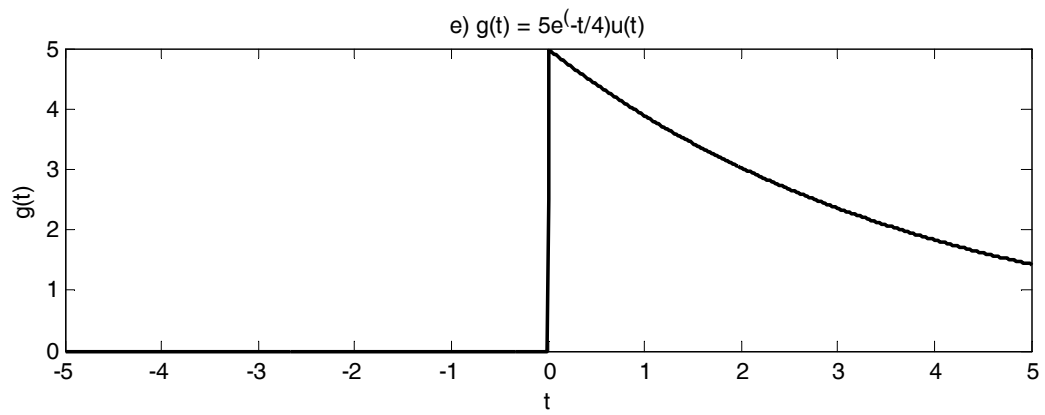
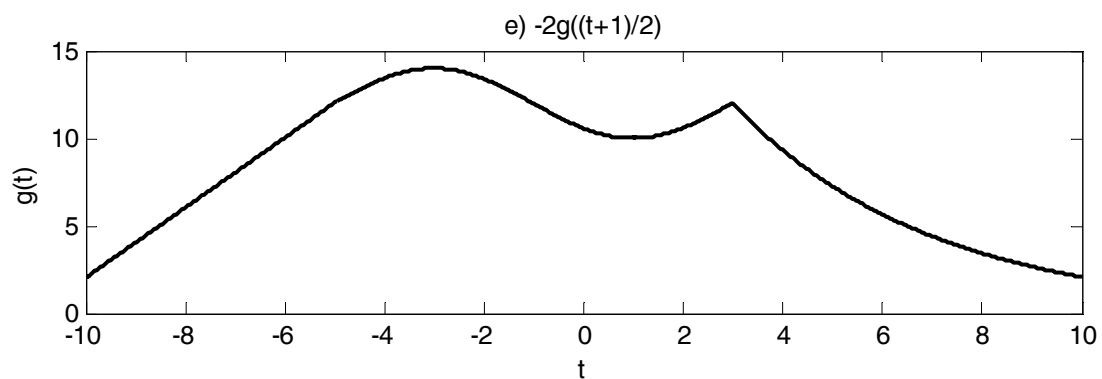
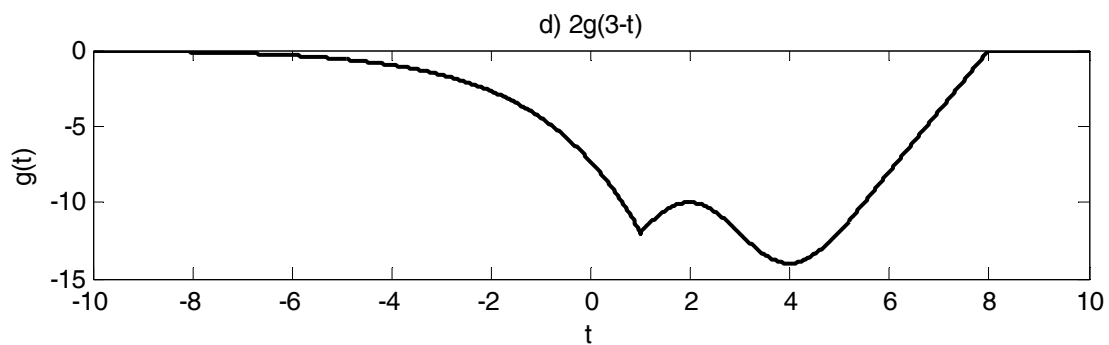
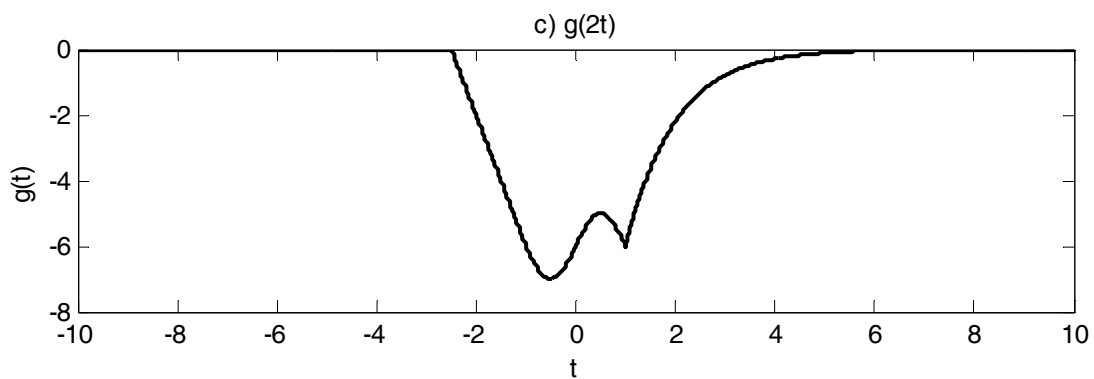
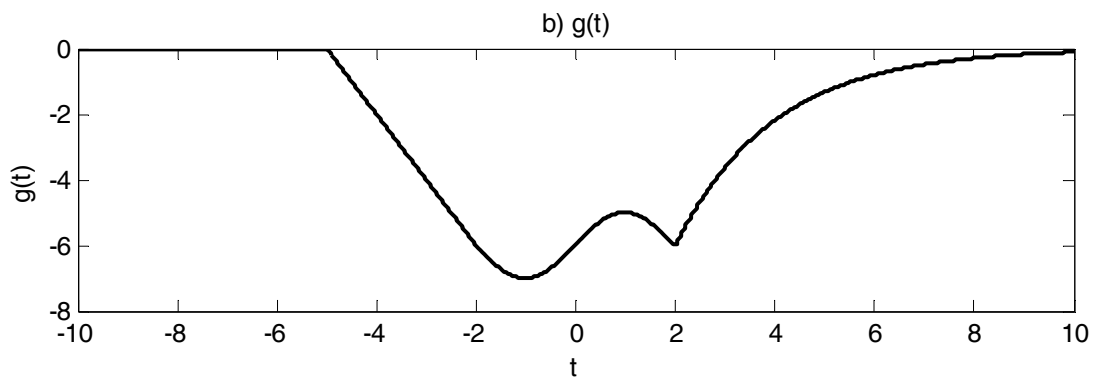


MAE 143A Homework 1 Solutions

34.



36. a)
$$g(t) = \begin{cases} 0 & , t < -5 \\ -2t - 10 & , -5 < t < -2 \\ \sin\left(\frac{\pi}{2}t\right) - 6 & , -2 < t < 2 \\ -6e^{1-t/2} & , t > 2 \end{cases}$$

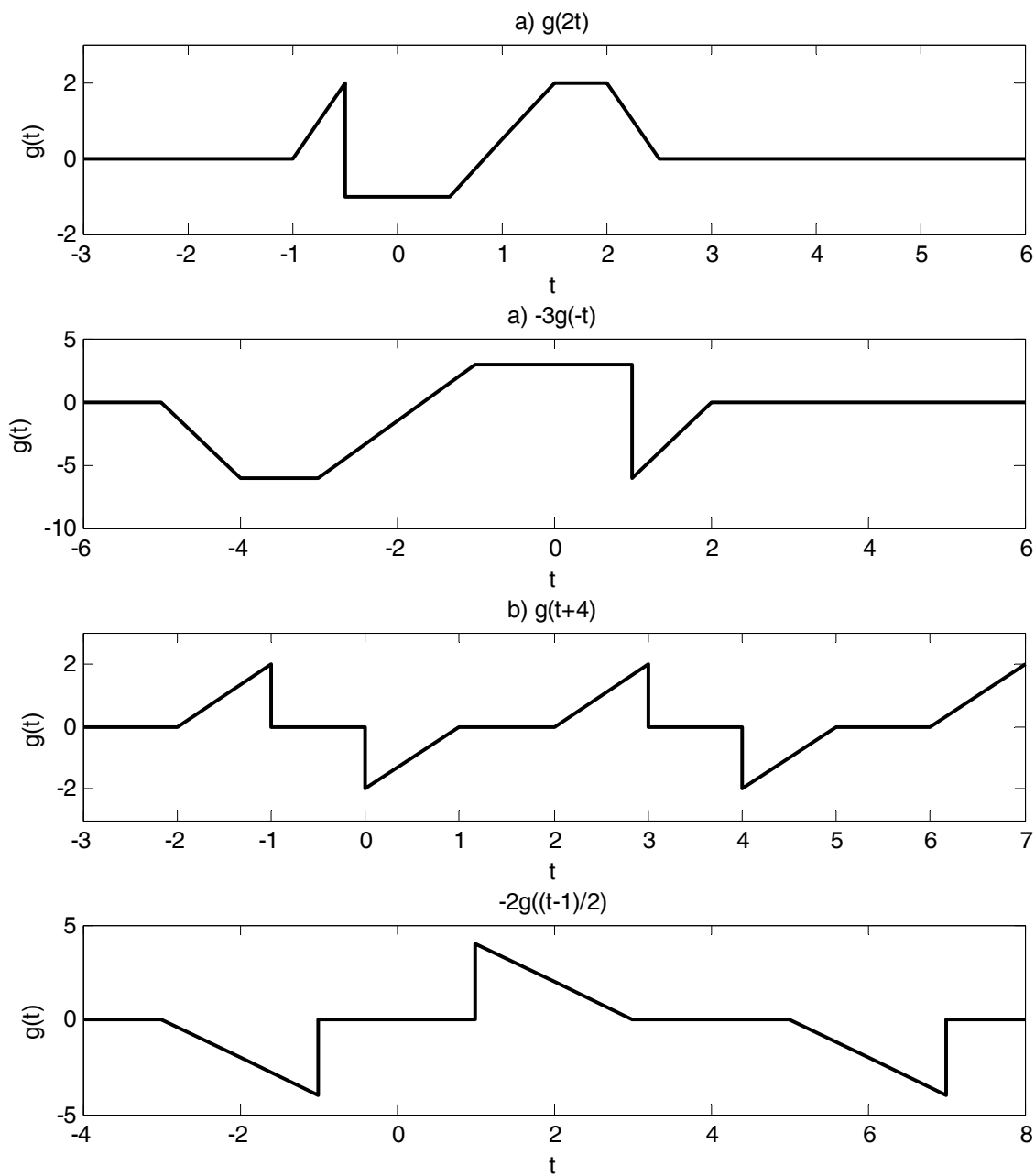


38. $x(t) = 5tri\left(\frac{t-0.05}{0.05}\right) + 5tri\left(\frac{t-0.15}{0.05}\right)$

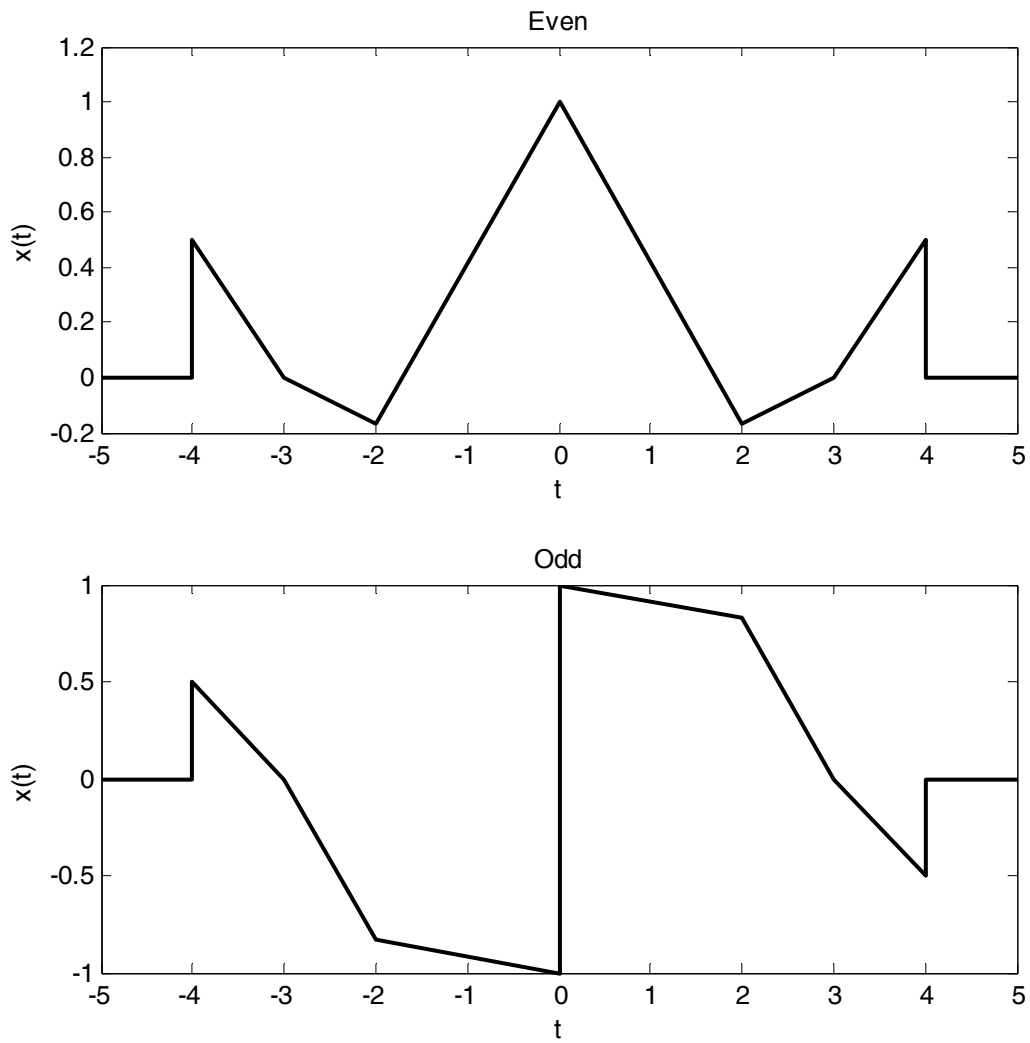
42. a) $x(t) = 15ramp\left(\frac{t}{4}\right) - 15\sum_{n=0}^{\infty} u(t-4-4n)$

b) $x(t) = 15\sum_{n=0}^{\infty} \left[tri\left(\frac{t-4-4n}{4}\right) rect\left(\frac{t-2-4n}{4}\right) \right]$

45.



58.



59. d) $g(t) = 28 \sin(400\pi t) + 12 \cos(500\pi t)$

Periodic

$$T_{01} = \frac{1}{200} \quad T_{02} = \frac{1}{250}$$

$$T_0 = \frac{1}{50} = 0.02 \text{ s} \quad (\text{LCM})$$

e) $g(t) = 10 \sin(5t) - 4 \cos(7t)$

Periodic

$$T_{01} = \frac{2\pi}{5} \quad T_{02} = \frac{2\pi}{7}$$

$$T_0 = 2\pi \text{ s} \quad (\text{LCM})$$

f) $g(t) = 4 \sin(3t) + 3 \sin(\sqrt{3}t)$

Not periodic

60. a) $x(t) = 2\text{rect}(-t)$

$$E = \int_{-\infty}^{\infty} [2\text{rect}(-t)]^2 dt$$

$$= 4 \int_{-1/2}^{1/2} 1 dt$$

$$= 4$$

b) $x(t) = \text{rect}(8t)$

$$E = \int_{-\infty}^{\infty} [\text{rect}(8t)]^2 dt$$

$$= \int_{-1/16}^{1/16} 1 dt$$

$$= \frac{1}{8}$$

c) $x(t) = 3\text{rect}\left(\frac{t}{4}\right)$

$$E = \int_{-\infty}^{\infty} \left[3\text{rect}\left(\frac{t}{4}\right)\right]^2 dt$$

$$= 9 \int_{-2}^2 1 dt$$

$$= 36$$