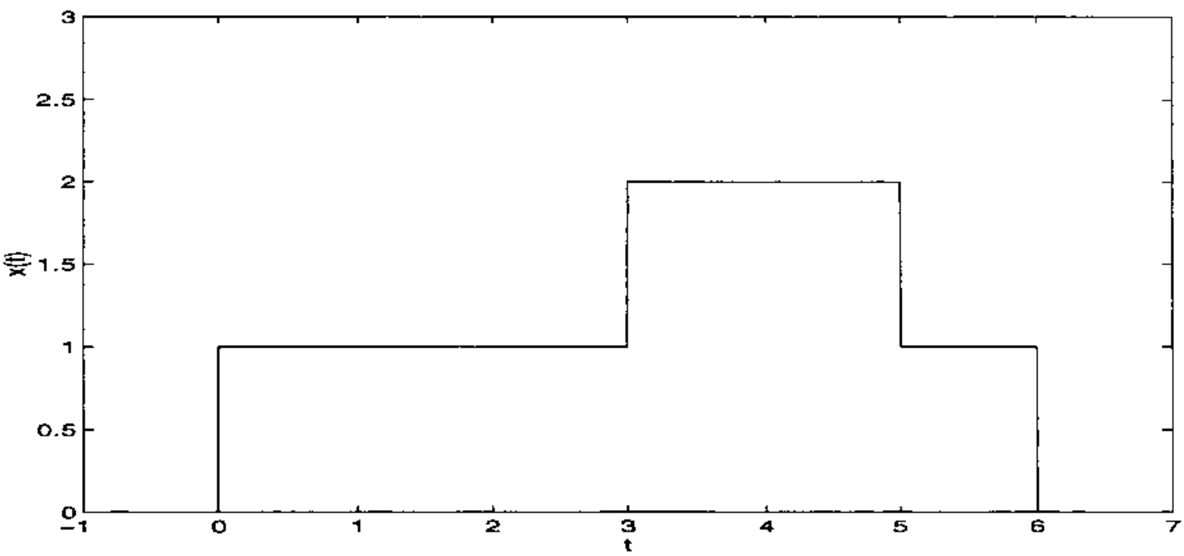
**Problem 1-11**

(a) $2\pi f_0 = 10\pi$, so $T_0 = 1/f_0 = 1/5 = 0.2$ s. (b) $2\pi f_0 = 17\pi$, so $T_0 = 1/f_0 = 1/8.5 = 0.1176$ s. (c ) $2\pi f_0 = 19\pi$, so $T_0 = 1/f_0 = 1/9.5 = 0.1053$ s. (d) We have $10\pi = 2\pi m f_0$ and $17\pi = 2\pi n f_0$, where $m$ and $n$ are integers and $f_0$ is the largest constant that satisfies these equations. The largest $f_0$ is 0.5 Hz with $m = 10$ and $n = 17$. (e) We have $10\pi = 2\pi m f_0$ and $19\pi = 2\pi n f_0$, where $m$ and $n$ are integers and $f_0$ is the largest constant that satisfies these equations. The largest $f_0$ is 0.5 Hz with $m = 10$ and $n = 19$. (f) We have $17\pi = 2\pi m f_0$ and $19\pi = 2\pi n f_0$, where $m$ and $n$ are integers and $f_0$ is the largest constant that satisfies these equations. The largest $f_0$ is 0.5 Hz with $m = 17$ and $n = 19$.

**Problem 1-14**

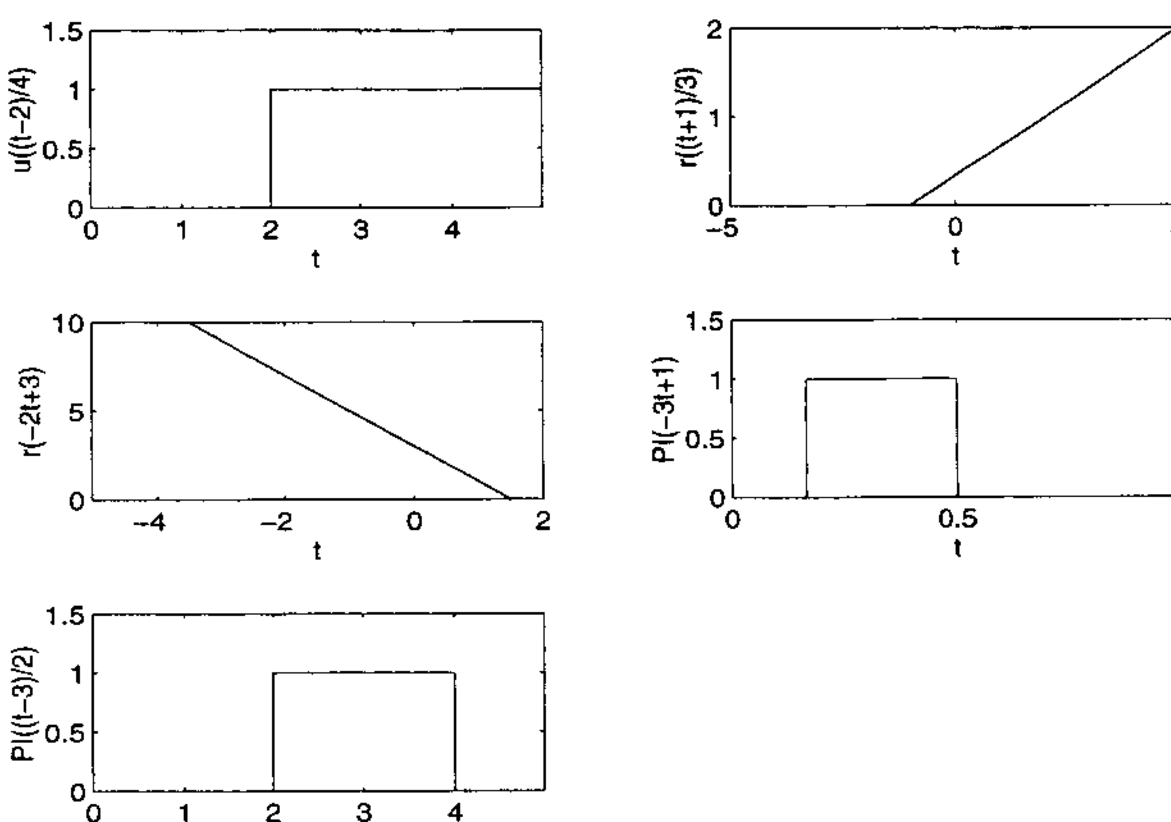
(a) A sketch is given below:

From the figure, it is evident that $x(t) = u(t) + u(t-3) - u(t-5) - u(t-6)$.




(b) The derivative of $x(t)$ is $dx(t)/dt = \delta(t) + \delta(t-3) - \delta(t-5) - \delta(t-6)$

Problem 1-16



**Problem 1-20**

Representations for the signals are given below (others may be possible):

$$x_a(t) = \sum_{n=0}^{\infty} r(t-3n)\,u(2-t-3n)$$

$$x_b(t) = \sum_{n=0}^{\infty} u(t-4n)\,u(2-t-4n)$$

$$x_c(t) = \sum_{n=0}^{\infty} 2\,\delta(t-2.5n)$$

$$x_d(t) = \sum_{n=0}^{\infty} \frac{2}{3}u(t-3n)\,r(3-t-3n)$$

**Problem 1-26**

(a) The integral is zero because the delta function is outside the range of integration.
(b) The integral evaluates as follows:

$$\int_0^5 \cos(2\pi t)\,\delta(t-2)\,dt = \cos(4\pi) = 1$$

(c ) This integral can be evaluated as

$$\int_0^5 \cos(2\pi t)\,\delta(t-0.5)\,dt = \cos(\pi) = -1$$

(d) The value of this integral is 0:

$$\int_{-\infty}^{\infty} (t-2)^2\,\delta(t-2)\,dt = (2-2)^2 = 0$$

(e) This integral evaluates to

$$\int_{-\infty}^{\infty} t^2\,\delta(t-2)\,dt = 2^2 = 4$$