1-26

a) $\int_5^{10} \cos 2\pi t \, \delta(t-2)\, dt = 0$

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

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

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

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

1.27

c) $\int_{-\infty}^{\infty} \left[e^{-3t} + \cos(2\pi t)\right] \delta'(t)\, dt = -\frac{d}{dt}\left[e^{-3t} + \cos 2\pi t\right]\Big|_{t=0}$

$= -\left[-3e^{-3t} - 2\pi \sin 2\pi t\right]\Big|_{t=0}$

$= 3e^{-0} + 2\pi \sin 0 = 3$

1.22

c) $x_3(t) = r(t) - r(t-1) - r(t-3) + r(t-4)$

d) $x_4(t) = r(t) - 2u(t-1) - r(t-2)$

1.36

a) $\frac{1}{2}$ W , b) $\frac{1}{2}$ W , c) $\frac{1}{2}$ W , d) $\frac{1}{2} + \frac{1}{2} = 1$ W , e) 1 W