A 1.3

$$x[n] = x_g[n] + x_u[n]$$

$$x_g[n] = \frac{1}{2}\left\{x[n] + x[-n]\right\} \quad ; \quad x_g[-n] = x_g[n]$$

$$x_u[n] = \frac{1}{2}\left\{x[n] - x[-n]\right\} \quad ; \quad x_u[-n] = -x_u[n]$$

(a) $$x_g[n] \cdot x_u[n] = \left(\frac{1}{4} \cdot \left\{x^2[n] - \cancel{x[n]x[-n]} + \cancel{x[n]x[-n]} - x^2[-n]\right\}\right) = \frac{1}{4}\left\{x^2[n] - x^2[-n]\right\}$$

(b) $$\sum_{n=-\infty}^{\infty} x_u[n] = \sum_{n=-\infty}^{\infty} \frac{1}{2}\left\{x[n] - x[-n]\right\} = \frac{1}{2}\sum_{n=-\infty}^{\infty} x[n] - \frac{1}{2}\sum_{n=-\infty}^{\infty} x[-n] =$$

$$= \frac{1}{2}\sum_{n=-\infty}^{\infty} x[n] - \frac{1}{2}\sum_{n=-\infty}^{\infty} x[n] = 0$$

(c) $$\sum_{n=-\infty}^{\infty} x^2[n] = \sum_{n=-\infty}^{\infty} \left(x_g[n] + x_u[n]\right)^2 = \sum_{n=-\infty}^{\infty} \left(x_g^2[n] + 2 \cdot x_g[n]x_u[n] + x_u^2[n]\right) =$$

$$= \sum_{n=-\infty}^{\infty} x_g^2[n] + 2\sum_{n=-\infty}^{\infty} x_g[n]x_u[n] + \sum_{n=-\infty}^{\infty} x_u^2[n] = \sum_{n=-\infty}^{\infty} x_g^2[n] + \sum_{n=-\infty}^{\infty} x_u^2[n]$$