1.

(eq. 1)

$$w[n] = -5x[n] - 0.5w[n-1] + 0.24q[n-2]$$

$$5x[n] = -w[n] - 0.5w[n-1] + 0.24q[n-2]$$

$$x[n] = \frac{-w[n] - 0.5w[n-1] + 0.24q[n-2]}{5}$$

(eq. 2)

$$y[n] = w[n-1] + 2x[n]$$

$$-2x[n] = w[n-1] - y[n]$$

$$x[n] = -\frac{w[n-1] - y[n]}{2}$$

(eq. 1 & 2)

$$\sum_{k=0}^{\infty} \frac{-w[n] - 0.5w[n-1] + 0.24q[n-2]}{5} = \sum_{p=0}^{\infty} \frac{-w[n-1] - y[n]}{2}$$

2.

(eq. 1)

$$q[n] = y[n] - 0.4q[n-1]$$

$$0.4q[n-1] = y[n] - q[n]$$

$$q[n-1] = 2.5(y[n] - q[n])$$

(eq. 2)

$$w[n] = q[n-1] + 0.3w[n-1]$$

$$-0.3w[n-1] = q[n-1] - w[n]$$

$$w[n-1] = -3.33(q[n-1] - w[n])$$

(eq. 1+2)

$$w[n-1] = -3.33((2.5(y[n] - q[n]) - w[n])$$

(eq. 3)

$$y[n] = 1.5x[n] + w[n-1]$$

$$w[n-1] = y[n] - 1.5x[n]$$

(eq. 1+2 & 3)

$$\sum_{k=0}^{\infty} -3.33((2.5(y[n] - q[n]) - w[n]) = \sum_{p=0}^{\infty} y[n] - 1.5x[n]$$

3.

(eq. 1)

$$q[n] = 40x[n] - 0.9q[n-1]$$

$$x[n] = \frac{1}{40}(0.9q[n-1] + q[n])$$

(eq. 2)

$$w[n] = -25x[n] + 0.2w[n-1]$$

$$w[n-1] = -\frac{1}{0.2}(-25x[n] - w[n])$$

$$x[n] = \frac{1}{25}(0.2w[n-1] - w[n])$$

(eq. 3)

$$y[n] = q[n-1] + w[n-1]$$

(eq. 1+2)

$$\sum_{k=0}^{\infty} \frac{1}{40}(0.9q[n-1] + q[n]) = \sum_{p=0}^{\infty} \frac{1}{25}(0.2w[n-1] - w[n])$$

4.

$$y[n] = \sum_{k=0}^{\infty} \frac{5}{6} x[n] + \frac{1}{6} q[n-1]$$