Prvo je potrebno naći funkciju sistema H(z). Stavimo li $x_n = z^n$ tada je $y_n = z^n\,\mathrm{H}(z)$. Diferentna jednačina time postaje $z^n\,\mathrm{H}(z) - z^{n-1}\,\mathrm{H}(z) + z^{n-2}\,\mathrm{H}(z) - z^{n-3}\,\mathrm{H}(z) = z^{n-4}$, tako da imamo:

$$\mathrm{H}(z) = \frac{z^{n-4}}{z^n - z^{n-1} + z^{n-2} - z^{n-3}} = \frac{1}{z^4 - z^3 + z^2 - z} = \frac{1}{z(z-1)(z^2+1)}$$

Nazivnik od H(z) smo prikazali u faktoriziranom obliku, što nije osobit problem. Da bismo našli odziv na pobudu $x_n = \sin(n\pi/2)$, $n \geq 0$ i $x_n = 0$, $n < 0$, treba nam njena z-transformacija X(z), koju direktno možemo očitati iz tablice:

$$\mathrm{X}(z) = \frac{z}{z^2+1}$$

z-transformacija odziva Y(z) dobija se kao Y(z) = X(z) H(z), tako da je:

$$\mathrm{Y}(z) = \frac{1}{(z-1)(z^2+1)^2}$$

Odziv y_n naći ćemo kao inverznu z-transformaciju od Y(z). U prikazu $\mathrm{Y}(z) = z\,\mathrm{P}(z)/\mathrm{Q}(z)$ imamo $\mathrm{P}(z) = 1$, $\mathrm{Q}(z) = z(z-1)(z^2+1)^2 = z(z-1)(z-i)^2(z+i)^2$. Polinom Q($z$) ima dvije proste nule i dvije dvostruke nule, pri čemu su one pri tome još i kompleksne. Pri tome je $\mathrm{Q}_1(z) = (z-1)(z^2+1)^2$, $\mathrm{Q}_2(z) = z(z^2+1)^2$, $\mathrm{Q}_3(z) = z(z-1)(z+i)^2$ i $\mathrm{Q}_4(z) = z(z-1)(z-i)^2$. Sada, u skladu sa izrazom za inverznu z-transformaciju racionalne funkcije, imamo:

$$y_n = \frac{1}{(0-1)(0^2+1)}0^n + \frac{1}{1\cdot(1^2+1)^2}1^n + \frac{1}{1!}\frac{\mathrm{d}}{\mathrm{d}z}\Big[\frac{z^n}{z(z-1)(z+i)^2}\Big]_{z=i} + \frac{1}{1!}\frac{\mathrm{d}}{\mathrm{d}z}\Big[\frac{z^n}{z(z-1)(z-i)^2}\Big]_{z=-i} =$$

$$= -\delta_n + \frac{1}{4} + \frac{\mathrm{d}}{\mathrm{d}z}\Big[\frac{z^{n-1}}{(z-1)(z+i)^2}\Big]_{z=i} + \frac{\mathrm{d}}{\mathrm{d}z}\Big[\frac{z^{n-1}}{(z-1)(z-i)^2}\Big]_{z=-i} =$$

$$= -\delta_n + \frac{1}{4} + \Big[\frac{(n-1)z^{n-2}(z-1)(z+i)^2 - z^{n-1}((z+i)^2 + 2(z-1)(z+i))}{(z-1)^2(z+i)^4}\Big]_{z=i} +$$

$$+ \Big[\frac{(n-1)z^{n-2}(z-1)(z-i)^2 - z^{n-1}((z-i)^2 + 2(z-1)(z-i))}{(z-1)^2(z-i)^4}\Big]_{z=-i} =$$

$$= -\delta_n + \frac{1}{4} + \frac{-4(n-1)i^{n-2}(i-1) - i^{n-1}(-4+4i(i-1))}{16(i-1)^2} + \frac{4(n-1)(-i)^{n-2}(i+1) - (-i)^{n-1}(-4+4i(i+1))}{16(i+1)^2} =$$

$$= -\delta_n + \frac{1}{4} + \frac{4(n-1)(i-1) - i(8+4i)}{-32i}i^n + \frac{-4(n-1)(i+1) + i(8-4i)}{32i}(-i)^n =$$

$$= -\delta_n + \frac{1}{4} + \frac{(3-n) + i(2-n)}{8}i^n + \frac{(3-n) - i(2-n)}{8}(-i)^n =$$

$$= -\delta_n + \frac{1}{4} + \frac{(3-n)+i(2-n)}{8}\Big(\cos\frac{n\pi}{2} + i\sin\frac{n\pi}{2}\Big) + \frac{(3-n)-i(2-n)}{8}\Big(\cos\frac{n\pi}{2} - i\sin\frac{n\pi}{2}\Big) =$$

$$= -\delta_n + \frac{1}{4} + \frac{(3-n)}{8}\cos\frac{n\pi}{2} - \frac{(2-n)}{8}\sin\frac{n\pi}{2} + i\frac{(3-n)}{8}\sin\frac{n\pi}{2} + i\frac{(2-n)}{8}\cos\frac{n\pi}{2} +$$

$$+ \frac{(3-n)}{8}\cos\frac{n\pi}{2} - \frac{(2-n)}{8}\sin\frac{n\pi}{2} - i\frac{(3-n)}{8}\sin\frac{n\pi}{2} - i\frac{(2-n)}{8}\cos\frac{n\pi}{2} =$$

$$= -\delta_n + \frac{1}{4}\Big(1 + (3-n)\cos\frac{n\pi}{2} - (2-n)\sin\frac{n\pi}{2}\Big),\quad n \geq 0$$

Za nalaženje odziva na pobudu $x_n = \cos(n\pi/4)$, $n \in \mathbb{Z}$, ne možemo koristiti z-transformaciju (barem ne jednostranu), zbog činjenice da pobuda nije kauzalna. Međutim, ovdje ćemo iskoristiti osobinu da je odziv na pobude oblika z^n jednak $z^n\,\mathrm{H}(z)$, zatim na činjenicu da se pobuda x_n može napisati kao $x_n = ((e^{\pi i/4})^n + (e^{-\pi i/4})^n)/2$, kao i na činjenicu da je sistem linearan. Odavde direktno slijedi:

$$y_n = \frac{1}{2}\left(e^{n\pi i/4}\mathrm{H}(e^{\pi i/4}) + e^{-n\pi i/4}\mathrm{H}(e^{-\pi i/4})\right) = \mathrm{Re}\left(e^{n\pi i/4}\mathrm{H}(e^{\pi i/4})\right) =$$

$$= \mathrm{Re}\,\frac{e^{n\pi i/4}}{e^{\pi i/4}(e^{\pi i/4}-1)(e^{\pi i/2}+1)^2} = \mathrm{Re}\,\frac{e^{n\pi i/4}}{(e^{\pi i/2}-e^{\pi i/4})(e^{\pi i}+2e^{\pi i/2}+1)} = \mathrm{Re}\,\frac{e^{n\pi i/4}}{2(e^{\pi i/2}-e^{\pi i/4})e^{\pi i/2}} =$$

$$= \mathrm{Re}\,\frac{e^{n\pi i/4}}{2(e^{\pi i}-e^{3\pi i/4})} = \mathrm{Re}\left(\frac{1}{-2+\sqrt{2}+i\sqrt{2}}(\cos\frac{n\pi}{4} + i\sin\frac{n\pi}{4})\right) =$$

$$= \mathrm{Re}\left(\frac{1}{-2+\sqrt{2}+i\sqrt{2}}\,\frac{-2+\sqrt{2}-i\sqrt{2}}{-2+\sqrt{2}-i\sqrt{2}}(\cos\frac{n\pi}{4} + i\sin\frac{n\pi}{4})\right) = \mathrm{Re}\left(\frac{-2+\sqrt{2}-i\sqrt{2}}{8-4\sqrt{2}}(\cos\frac{n\pi}{4} + i\sin\frac{n\pi}{4})\right) =$$

$$= \frac{-2+\sqrt{2}}{8-4\sqrt{2}}\cos\frac{n\pi}{4} + \frac{\sqrt{2}}{8-4\sqrt{2}}\sin\frac{n\pi}{4} = \frac{(-2+\sqrt{2})(2+\sqrt{2})}{(8-4\sqrt{2})(2+\sqrt{2})}\cos\frac{n\pi}{4} + \frac{\sqrt{2}\,(2+\sqrt{2})}{(8-4\sqrt{2})(2+\sqrt{2})}\sin\frac{n\pi}{4} =$$

$$= \frac{-2}{8}\cos\frac{n\pi}{4} + \frac{2+2\sqrt{2}}{8}\sin\frac{n\pi}{4} = -\frac{1}{4}\cos\frac{n\pi}{4} + \frac{1+\sqrt{2}}{4}\sin\frac{n\pi}{4},\ n \in \mathbb{Z}$$