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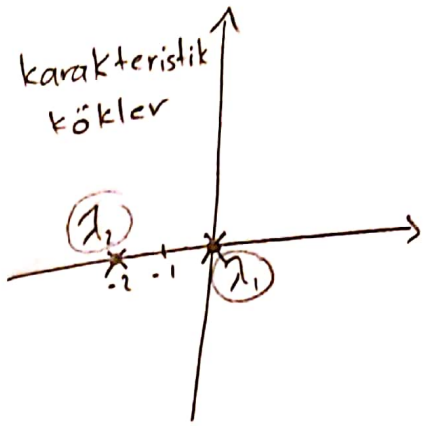
a) $D(D+2)y(t) = 3f(t)$

$\lambda(\lambda+2)=0 \Rightarrow \lambda_1 = 0$

$\lambda_2 = -2 < 0$



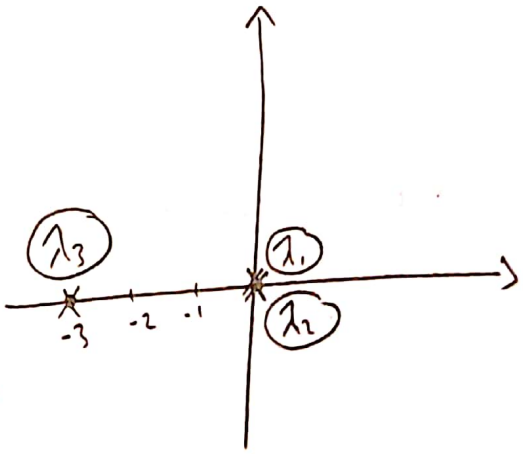
- $\mathrm{Re}\,\lambda_1 = 0$ ve $\mathrm{Re}\,\lambda_2 = -2 < 0$ olduğundan, sistem kararlıdır.

b) $D^2(D+3)y(t) = (D+5)f(t)$

$\lambda^2(\lambda+3)=0 \Rightarrow \lambda_1 = 0$

$\lambda_2 = 0$

$\lambda_3 = -3 < 0$

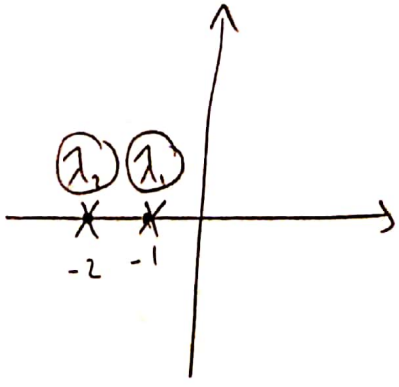


- λ_1, λ_2 tekrarlanan kökler olduğundan sistem kararsızdır.

c) $(D+1)(D+2)y(t) = (2D+3)f(t)$

$(\lambda+1)(\lambda+2)=0 \Rightarrow \lambda_1 = -1 < 0$

$\lambda_2 = -2 < 0$



- Tüm kökler < 0 olduğuna göre sistem kararlıdır.

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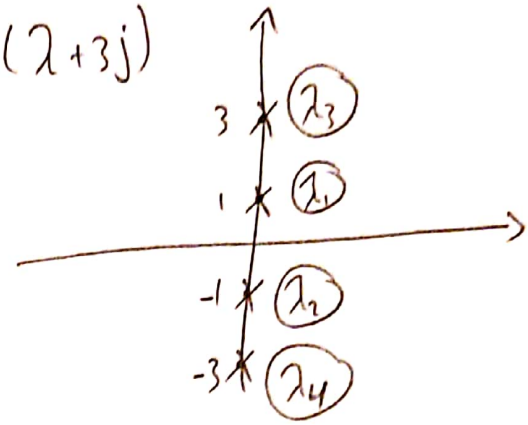
d) $(D^2+1)(D^2+9)y(t) = (D^2+2D+4)f(t)$

$(\lambda^2+1)(\lambda^2+9) = (\lambda-j)(\lambda+j)(\lambda-3j)(\lambda+3j)$

$\lambda_{1,2} = \pm j \quad , \quad \lambda_{3,4} = \pm 3j$



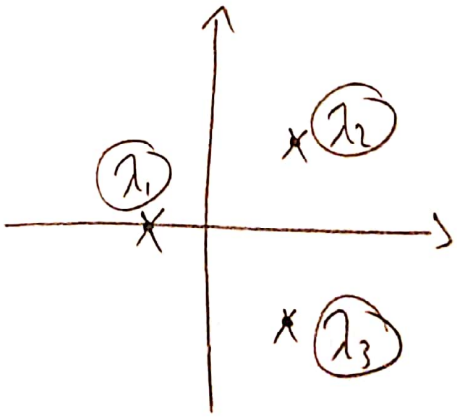
- Tekrarlanan kökler imaginary eksende olduğu için sistem kararlıdır.

e) $(D+1)(D^2-4D+9)y(t) = (D+7)f(t)$

$(\lambda+1)(\lambda^2-4\lambda+9) = (\lambda+1)(\lambda-2-\sqrt{5}j)(\lambda-2+\sqrt{5}j)$

$\lambda_1 = -1 < 0$

$\lambda_{2,3} = 2 \pm \sqrt{5}j > 0$



- iki kök >0 olduğu için sistem kararsızdır.