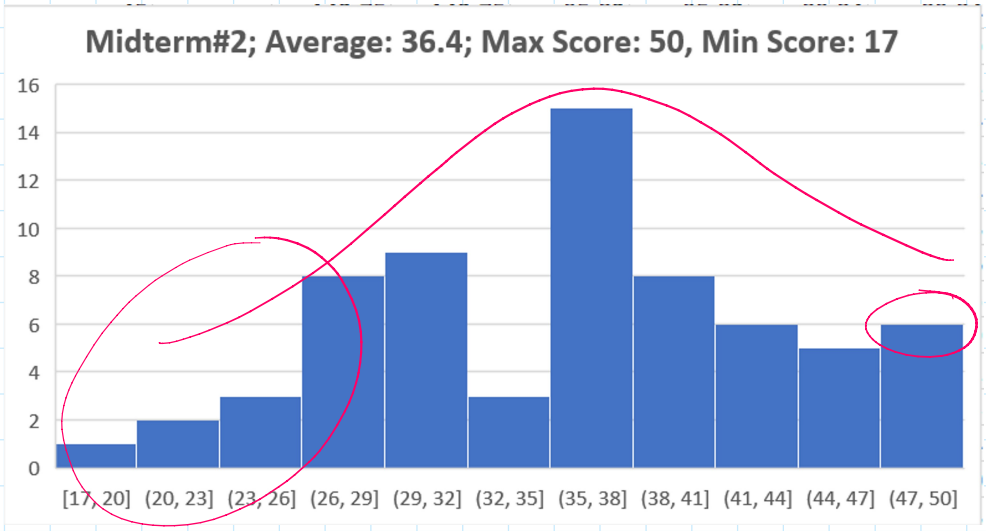
Lec-21

Monday, March 9, 2020 8:45 AM



Remedy Plan: If you score more than 80% in finals then lowest midterm will be replaced with final score.

Constant VSWR circle.

$$VSWR = \frac{1+|\Gamma_L|}{1-|\Gamma_L|}$$

$$V_{max} = V^+(1+|\Gamma_L|)$$

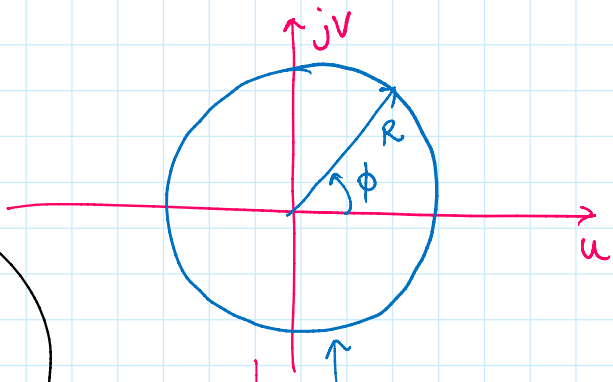
$$I_{min} = \frac{V^+}{Z_0}(1-|\Gamma_L|)$$

$$R_{max} = \frac{V_{max}}{I_{min}} = Z_0\left(\frac{1+|\Gamma_L|}{1-|\Gamma_L|}\right)$$

$$R_{max} = Z_0 \cdot VSWR$$

$$V_{min} = V^+(1-|\Gamma_L|)$$

$\Gamma_L = Re^{j\phi}$



Constant VSWR circle

At every point on this circle $|\Gamma_L|$ is constant R

$\Rightarrow$ VSWR = Constant.

$$V_{min} = V^+ (1 - |\Gamma_L|)$$

$$I_{max} = \frac{V^+}{Z_0} (1 + |\Gamma_L|)$$

$$\frac{V_{min}}{I_{max}} = R_{min} = Z_0 \left(\frac{1 - |\Gamma_L|}{1 + |\Gamma_L|} \right)$$

$$\boxed{R_{min} = \frac{Z_0}{VSWR}}$$

$$\frac{R_{max}}{Z_0} = VSWR$$

$$\bar{R}_{max} = VSWR$$

$$\bar{R}_{min} = \frac{1}{VSWR}$$

Rotation on a smith chart

$$2\beta l = 2\pi$$

$$2 \cdot \frac{2\pi}{\lambda} \cdot l = 2\pi$$

$$\boxed{l = \lambda/2}$$ → Rotation of 2π on a smith chart = moving a distance of $\lambda/2$ on a transmission line.

Example 1: Find VSWR on a smith chart

$Z_0 = 75\Omega$

$Z_L = 30 - j90$

Step 1: $\bar{Z}_L = \frac{30 - j90}{75} = 0.4 - j1.2$

Step 2: Draw constant VSWR circle

Step 3: VSWR

Calculate ϕ_L