7.13 We are asked to compute the critical resolved shear stress for Zn. As stipulated in the problem, $\phi = 65°$, while possible values for λ are 30°, 48°, and 78°.

(a) Slip will occur along that direction for which ($\cos \phi \cos \lambda$) is a maximum, or, in this case, for the largest $\cos \lambda$. Cosines for the possible λ values are given below.

$$\cos(30°) = 0.87$$
$$\cos(48°) = 0.67$$
$$\cos(78°) = 0.21$$

Thus, the slip direction is at an angle of 30° with the tensile axis.

(b) From Equation 7.4, the critical resolved shear stress is just

$$\tau_{crss} = \sigma_y (\cos \phi \cos \lambda)_{max}$$

$$= (2.5 \text{ MPa}) \left[\cos(65°) \cos(30°)\right] = 0.90 \text{ MPa} \quad (130 \text{ psi})$$