# 70001 Tutorial 3

- You are given a distribution of 10 values as follows: 15, 5, 5, 25, 5, 10, 15, 5, 5, 10. Given four randomly drawn variables: $\mu_1 = 0.5$, $\mu_2 = 0.25$, $\mu_3 = 0.9$ & $\mu_4 = 0.65$, what will be the correspondingly selected values when sampled with the given random variables?

- Given a microfacet BRDF, assume a sample ω_h being drawn from the proposal distribution has probability $p(\omega_h) = 0.5$. Compute the final weight of the sample $p(\omega_r)$ for Monte Carlo rendering of direct illumination. Assume the following config.:
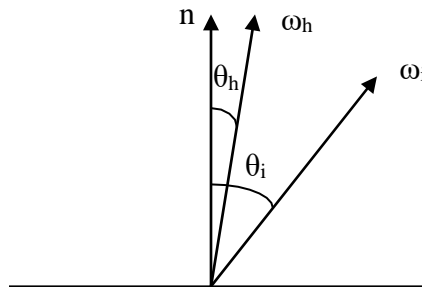
  Here n, ω_h and ω_i are in the same plane. $\theta_h = 15°$, and $\theta_i = 45°$.

Also derive the relation between $p(\omega_h)$ and $p(\omega_r)$ using change of variables. (**Hint:** compute $d\omega_h/d\omega_i$)

- Given an isotropic Ward BRDF with distribution defined as: $p(\omega_h) \sim \exp(-\tan^2\theta_h/\alpha^2)$, where ω_h is the half vector and α is the specular roughness. Given two random variables $u_1 = 0.4$ and $u_2 = 0.2$, compute the sampled half vector ω_h in terms of its spherical coordinates (θ_h, φ_h) for a Ward lobe with roughness $\alpha = 0.2$.