3 $C_{MP}^{GC} = \arg\max\{P(C|X)\} = \arg\max\{P(C)\, f(X|C)\}$

$= \arg\min\{-2\ln(P(C)) + \ln(|\Sigma_C|) - (X-\mu_C)^T \Sigma^{-1} (X-\mu_C)\}$

$- \arg\max\{(-\ln P(C)) + (-\ln f(X|C))$

$= \arg\min\left[-\ln(P(C)) + \left(-\ln\left[\overbrace{(2\pi)^{-\frac{d}{2}}}^{=C} |\Sigma_C|^{-0.5} \exp\{-0.5\,(X-\mu_C)^T \Sigma^{-1} (X-\mu_C)\}\right]\right]\right\}$

$= \arg\min[-\ln(P(C)) + 0.5 \ln|\Sigma_C| + 0.5\,(X-\mu_C)^T \Sigma^{-1} (X-\mu_C)]$

$(\times 2$ $= \arg\min\{-2\ln(P(C)) + \ln(|\Sigma_C|) + (X-\mu_C)^T \Sigma^{-1} (X-\mu_C)\}$