Homework Set #7 Solutions:

(1.) $(n_1, n_2) \sim MULT(n, \pi_1, \pi_2)$, $H_0: \pi_1 = .75, \pi_2 = .25$

data: $n_1 = 854$, $n_2 = 249$, $n = 1103$

$m_j = n\pi_{j0}$,

$m_1 = 827.25$, $m_2 = 275.75$

(a) $X^2 = \sum \frac{(n_j - m_j)^2}{m_j} = 3.46$, (b) $\chi^2_{.10}(1) = 2.7$

(c) The genetic model is not compatible with the observed data.

(d) A dichotomous measure of evidence does not provide as much information as a more quantitative evidence measure, nor does the dichotomous measure provide information about effect size.

(2.) (a) 90% CI for $\pi_1 = \hat{\pi}_1 \pm 1.645\sqrt{\frac{\hat{\pi}_1(1-\hat{\pi}_1)}{n}}$

$(\hat{\pi}_1 = .7743)$ $= [.7535, .7950]$

(b) Based on the observed data, we estimate that the prob. of a green seedling is between .7535 and .7950

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> obs = c(854,249)
> n = sum(obs)

> pi.0 = c(.75,.25)
> m = n*pi.0

> c = length(obs)
> comp.level = .90
> cutoff = qchisq(comp.level,c-1)

> X2 = sum((obs-m)^2/m)
> G2 = 2*sum(obs*log(obs/m))
> print(c(X2,G2,cutoff))
[1] 3.459958 3.539017 2.705543

> pi.hat = obs[1]/n
> lower = pi.hat - qnorm(.95)*sqrt(pi.hat*(1-pi.hat)/n)
> upper = pi.hat + qnorm(.95)*sqrt(pi.hat*(1-pi.hat)/n)
>
> print(pi.hat,digits = 4)
[1] 0.7743
> print(c(lower,upper),digits = 4)
[1] 0.7535 0.7950
```