Math 263 Exam 2 Review Solutions

Basic Probability

a. 1-.12-.31-.29 = .28
b. 1-0.12 = 0.88

Conditional Probability and Independence

a. $P(A^c) = 0.69$
b. P(A and B) = 0.08

	Car	Light truck	
Domestic	.23	.55	.78
Imported	.08	.14	.22
	.31	.69	1

c. P(light truck | imported) = P(light truck & imported) / P(imported) = 0.14*/(1-0.78) = 0.6364
d. P(light truck) = 0.69
   P(imported) = 0.22
   P(light truck)*P(imported) = 0.1518
   P(light truck & imported) = 0.14
   Not independent.

Mean and Variance

a. $\mu_x + \mu_Y$
b. $\mu_x - \mu_Y$
c. $(\sigma_X^2+\sigma_Y^2)^{1/2}$
d. $(\sigma_X^2+\sigma_Y^2)^{1/2}$

CLT

You can think of the 100-question test as a sample of 100 from a population with proportion 0.88. Then the proportion she gets right on the test is normally distributed by CLT. (Alternatively, the count she gets right is Binomila.)

1. a. $\sigma = (p(1-p)/100)^{1/2} = 0.0325$
   $z = (.85-.88)/.0325 = -0.923$
   $p = 0.178$

   b. $\sigma = (p(1-p)/n)^{1/2} = 0.21$ (n=250/100)
   $z = (.85-.88)/.021 = -1.46$
   $p=0.0721$

   c. $\sigma = 0.0325/2 = 0.0163 = (p(1-p)/n)^{1/2}$
   $n = p(1-p)/\sigma^2 = .88*.12/.0163^2 = 400$ questions (approximately)
   Exactly 400 question if you do the calculations exactly

2. a. $\mu_{\bar{x}} = 0.5$

   $\sigma_{\bar{x}} = 0.7/\text{sqrt}(50) = 0.099$

   b. $z = (0.6-0.5)/0.099 = 1.01$

   $p = 1- 0.8438 = 0.1562$