R10.2 a) observational study - no treatments were imposed, drivers were observed concerning their seatbelt habits.

b) π_1 = proportion of female Hispanic drivers in NY who wear seat belts

π_2 = proportion of female Hispanic drivers in Boston who wear seat belts

Assumptions

1) Both samples are random - given
2) $220(.831) \geq 10$, $182.82 \geq 10$
   $220(1-.831) \geq 10$, $37.18 \geq 10$
   $117(.581) \geq 10$, $67.977 \geq 10$
   $117(1-.581) \geq 10$, $49.023 \geq 10$
3) Samples are independent - assume

Two Sample Z Confidence interval for the difference of two proportions

(.14847, .35277)

We are 95% confident that the interval from .14847 to .35277 does contain the true difference in the proportion of female Hispanic drivers in the two cities who wear seat belts.

c) Yes the interval supports this. Because both endpoints are positive, the first population, NY, is greater than the second, Boston.

males	females
$\bar{x}_1 = 272.40$	$\bar{x}_2 = 274.73$
$s_1 = 59.2$	$s_2 = 57.5$
$n_1 = 840$	$n_2 = 1077$

R10.4 μ_1 = mean scores for men on the NAEPs test
μ_2 = mean scores for women on the NAEPs test

$H_0: \mu_1 = \mu_2$
$H_a: \mu_1 \neq \mu_2$

Assumptions
1) both are SRS - given
2) $n_1 > 30$, $840 > 30$
$n_2 > 30$, $1077 > 30$
3) Samples are independent - assume

Two Sample T test for the difference of two means

$t = -.8658$ $\quad p = .3867$

$.3867 > .01$ Fail to reject H_0

At the .01 significance level, our evidence does not show that there is a difference between the mean scores for men and women on the NAEP test.

Skittles problem

π_1 = proportion of Skittles that are lemon.
π_2 = " " " " " Lime.
π_3 = " " " " " orange.
π_4 = " " " " " strawberry.
π_5 = " " " " " grape.

H_0: $\pi_1 = \pi_2 = \pi_3 = \pi_4 = \pi_5$
H_a: H_0 is not true

Assumptions
1) SRS - assume
2) Expected counts are at least 5.
$60(.2) = 12 \geq 5$

Chi Square Goodness of Fit

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

(We need observed data to finish this problem. Put observeds in L_1, expecteds in L_2. Do a stat, tests, D.)

AZT	Placebo
$n_1 = 435$	$n_2 = 435$
$x_1 = 17$	$x_2 = 38$
$p_1 = 17/435$	$p_2 = 38/435$
$.039$	$.087$

R10.5

π_1 = proportion taking AZT who develop AIDS
π_2 = proportion taking the placebo who develop AIDS

$H_0: \pi_1 = \pi_2$
$H_a: \pi_1 < \pi_2$

Assumptions

1) Both samples are random ~~xxxxxx~~ subjects were not randomly selected but they were randomly assigned to the treatment groups
2) $435(.039) \geq 10,\ 16.9 \geq 10$
$435(1-.039) \geq 10,\ 418.0 \geq 10$
$435(.087) \geq 10,\ 37.8 \geq 10$
$435(1-.087) \geq 10,\ 397.16 \geq 10$
3) Samples are independent - assume

Two Sample Z test for the difference in two proportions

$Z = -2.926 \quad p = .0017$

$.0017 < .05$ Reject H_0

At the .05 significance level, our evidence does show that taking AZT lowers the proportion of infected people who will develop AIDS in a given period of time.

90.

a) It was important to randomly assign the order of the masks because the students may Learn from doing the first maze and show an improvement on the second one. Randomization Controls for this variable.

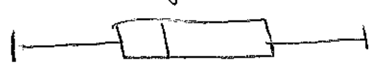
b) μ_d = the mean difference in puzzle completion times

$H_0: \mu_d = 0$

$H_a: \mu_d > 0$ (This would show that unscented times were higher. When you subtract, differences would be positive numbers.)

Assumptions

1) SRS - subjects were randomly assigned to treatments

2)  boxplot shows differences are approx normal

3) Data are paired - given

Matched Pairs T test

$t = .3499$ $p = .3650$ $.3650 > .05$ Fail to reject H_0

At the .05 significance level, our evidence does not show that the floral scent mask improved performance.

R11.5

a) a comparative bar chart would be appropriate

b)
H_0: Gender and goals for elementary students are independent
H_a: Gender and goals are not independent

↑ This would mean there is an association between them.

Assumptions
1) SRS - given
2) Expected counts are ≥ 5.

$$\begin{bmatrix} 129.7 & 74.04 & 47.3 \\ 117.3 & 67 & 42.7 \end{bmatrix}$$

Chi square test for Independence $\chi^2 = \sum \frac{(O-E)^2}{E}$

$\chi^2 = 21.455$ $p = .0000219$ $df = 2$
$(2-1)(3-1)$

$.0000219 < .05$ Reject H_0

At the .05 significance level, our evidence does show the gender and goals for elementary students are not independent; there is an association.