Math 3070 § 1.	**Family Planning Example:**	Name: Example
Treibergs	**Two-Sample Test of Proportion**	June 5, 2011

Is it more likely that married couples without children plan to have children if they newly married than if they have been married several years? In a study by O'Connell and Rogers of the Census Bureau in 1979, two groups of wives aged 25 to 29 were selected at random and each wife was asked if she eventually planned to have children. One group was selected from among those wives married less than two years and the other from among those wives married five years. 240 of 300 wives married less than two years planned to have children some day compared to 288 of 400 wives married five years. Can we conclude the proportion of wives married less than two years is significantly higher than the proportion of wives married five years? This example comes from Walpole, Myers & Myers, *Probability and Statistics for Engineers and Scientists, 6th ed.*, Prentice Hall, 1998.

R Session:

```
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[R.app GUI 1.31 (5538) powerpc-apple-darwin8.11.1]

[Workspace restored from /Users/andrejstreibergs/.RData]

> ############## ENTER THE CONTINGENCY TABLE ########################
>
> ChildPlan <- matrix(c(240,288,300-240,400-288),ncol=2)
> names(dimnames(ChildPlan))<-c("Time.Married","Plan.Children")
> rownames(ChildPlan) <- c("2.yr.or.less","Over.2.yr.")
> colnames(ChildPlan) <- c("Yes","No")
> addmargins(ChildPlan)
              Plan.Children
Time.Married   Yes  No Sum
  2.yr.or.less 240  60 300
  Over.2.yr.   288 112 400
  Sum          528 172 700
```

```
> ################## RUN CANNED TEST OF TWO PROPORTIONS ###############
>
> # Since all counts exceed 10, it is a "large sample" test and the z
> # approximation is acceptable.
>
> # alternative="greater" is one sided test
> # correct=FALSE means Yate's correction is not used.
>
> prop.test(ChildPlan,alternative="greater",correct=FALSE)

2-sample test for equality of proportions without
continuity correction

data:  ChildPlan
X-squared = 5.9197, df = 1, p-value = 0.007486
alternative hypothesis: greater
95 percent confidence interval:
 0.02702311 1.00000000
sample estimates:
prop 1 prop 2
  0.80   0.72

> # Conclude that the proportion p1 is significantly higher.
> ################## TEST OF TWO PROPORTIONS "BY HAND" #################
>
> p1hat <- 240/(300);p1hat
[1] 0.8
> p2hat <- 288/400; p2hat
[1] 0.72
> phat <- (240+288)/(300+400);phat; qhat <- 1-phat;qhat
[1] 0.7542857
[1] 0.2457143
> n1 <- 300; n2 <- 400; c(n1,n2)
[1] 300 400
>
> z <- (p1hat-p2hat)/sqrt(phat*qhat*(1/n1 + 1/n2)); z
[1] 2.433035
> alpha <- .05
> qnorm(alpha,lower.tail=FALSE)
[1] 1.644854
>
> pvalue <- pnorm(z,lower.tail=FALSE); pvalue
[1] 0.007486416
> # Reject H0: p1=p2 in favor of H1: p1 > p2.
>
> ################### CONFIDENCE INTERVAL FOR  p1 - p2  #################
> zalpha <- qnorm(alpha,lower.tail=FALSE); zalpha
[1] 1.644854
> c(p1hat-p2hat-zalpha*sqrt(p1hat*(1-p1hat)/n1+p2hat*(1-p2hat)/n2),1)
[1] 0.02702311        1
```