**Assignment 18.2**

In one state, 52% of the voters are Republicans, and 48% are Democrats. In a second state, 47% of the voters are Republicans, and 53% are Democrats. Suppose a simple random sample of 100 voters are surveyed from each state.

What is the probability that the survey will show a greater percentage of Republican voters in the second state than in the first state?

State1 – P1(Voters are Republicans) = 0.52

State2 – P2(Voters are Republicans) = 0.47

Number of voters from each state n = 100

n1P1 = 100 \* 0.52 = 52

n1(1-P1) = 100\*0.48 = 48

n2P2 = 100 \* 0.47 = 47

n2(1-P2) = 100 \* 0.53 = 53

Mean : Difference of sample proportions =

μ(p1 – p2) = P1-P2 = 0.52 – 0.47 = 0.05

Standard deviation of the difference:

σd = sqrt{ [ P1(1 - P1) / n1 ] + [ P2(1 - P2) / n2 ] }

σd = sqrt{ [ (0.52)(0.48) / 100 ] + [ (0.47)(0.53) / 100 ] }

σd = sqrt (0.002496 + 0.002491) = sqrt(0.004987) = 0.0706

Here we are required to find that probability p1 is less than p2 which is like p1 - p2 is less than zero. To find this probability, we need to transform the random variable (p1 - p2) into a z-score.

z(p1-p2) = x - μ(p1 – p2)/ σd – (0 – 0.05)/0.0706 = -0.7082

P(z <=0.7082) = 0.24

The probability that the survey will show a greater percentage of Republican voters in the second state than in the first state is 0.24.