Assignment --- 3.1

5. Problem Statement 1. As voters exit the polls, you ask a representative random sample of 6 voters if they voted for proposition 100. If the true percentage of voters who vote for the proposition is 55.1%, what is the probability that, in your sample, exactly 2 voted for the proposition and 4 did not?

Answer: Ways to arrange 2 votes among 6 votes is mentioned under the outcome column.

Outcome Probability

YYNNNN = (.551)2 *x* (.449)4

NYYNNN (.449)1 *x* (.551)2 *x* (.449)3 = (.551)2 *x* (.449)4

NNYYNN (.449)2 *x* (.551)2 *x* (.449)2 = (.551)2 *x* (.449)4

NNNYYN (.449)3 *x* (.551)2 *x* (.449)1 = (.551)2 *x* (.449)4

NNNNYY (.449)4 *x* (.551)2 = (.551)2 *x* (.449)4

15 arrangements *x* (.551)2 *x* (.449)4

∴P(2 yes votes exactly) = 15 *x* (.551)2 *x* (.449)4 = 18.5%

2. Professor Willoughby is marking a test.

Here are the students’ results (out of 60 points):

20, 15, 26, 32, 18, 28, 35, 14, 26, 22, 17

Most students didn't even get 30 out of 60, and most will fail.

The test must have been really hard, so the Prof decides to standardize all the scores and only fail people 1 standard deviation below the mean. So who will fail?

Answer: Mean m= (20+15+26+32+18+28+35+14+26+22+17)/11

M=23

Standard deviation



Standard deviation = 6.6

The Standard Scores:

-0.45, -1.21, 0.45, 1.36, -0.76, 0.76, 1.82, -1.36, 0.45, -0.15, -0.91

Only two students will fail who have marks 15 and 14.

Assignment 3.2

5. Problem Statement Practical Application of CLT

1. Engineers must consider the breadths of male heads when designing motorcycle helmets for men. Men have head breadths that are normally distributed with a mean of 6.0 inches and a standard deviation of 1.0 inch

a. If one male is randomly selected, what is the likelihood that his head breadth is less than 6.2 inches?

Answer z = (6.2-6.0)/1.0=0.20

P(x<6.2) = P(z<0.2) = 0.5793

b. The Safeguard Helmet company plans an initial production run of 100 helmets. How likely is it that 100 randomly selected men have a mean head breadth of less than 6.2 inches?

Answer: Using the central limit theorem

N = 100>30

= 6.2 inches

σ= σ/ = 1.0/ = .1

Z = (6.2-6.0)/.0.1 = .2/.1 = 2.00

P(z<2.00) = .9772

c. The production manager sees the result in part b and reasons that all helmets should be made for men with head breadths of less than 6.2 inches, because they would fit all but a few men. What is wrong with that reasoning?

Answer : Probabilities concerning means don’t apply to individuals. Part (a) is relevant since the helmets will be worn

Two-tailed Test Of Population Mean With Known Variance

2. Suppose the mean weight of King Penguins found in an Antarctic colony last year was 15.4 kg. In a sample of 35 penguins same time this year in the same colony, the mean penguin weight is 14.6 kg. Assume the population standard deviation is 2.5 kg. At .05 significance level, can we reject the null hypothesis that the mean penguin weight does not differ from last year?