Stat 1040
Quiz 9, Fall 2014

Name_____
Recitation Instructor_____

1. A *Utah quarter* is tossed 400 times and it comes up *heads* 225 times. Is the coin fair? Give an appropriate box model, state the null hypothesis, identify the test statistic, and compute the P-value. (5 points)

Draw 400 & consider the sum of draws.

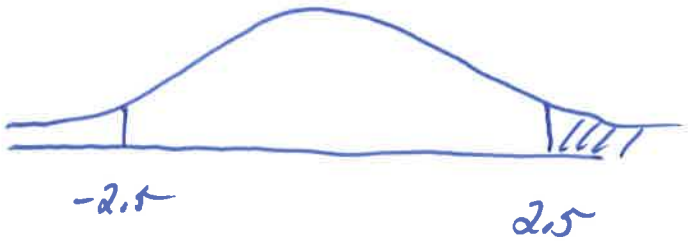
Null: coin is fair. (Box AV $= \frac{1}{2}$)

Test statistic: sum of draws
(follows normal curve)

SE for sum = Box SD $\times \sqrt{400} = \frac{1}{2} \cdot 20 = 10$.

EV for sum = 200

$\frac{225 - 200}{10} = 2.5$



$A(2.5) = 98.76$

$\frac{100 - 98.76}{2} = .62\%$

p-value $\approx .62\%$ or .0062

We reject the null; the coin is probably biased.

2. A car manufacturer believes that the average mileage per gallon of one of its new models exceeds the EPA rating of 43 miles per gallon. To gain evidence to support its belief, the manufacturer randomly selected 15 cars and recorded the miles per gallon for each car on a 100-mile course. The results for this sample are: AV = 43.7 and SD = 3.8 . Give an appropriate box model, state the null hypothesis, identify the test statistic, and compute the P-value. (5 points)

mpg s → Draw 15 & consider the AV of draws.

Null: Box AV = 43 Alternate: Box AV > 43

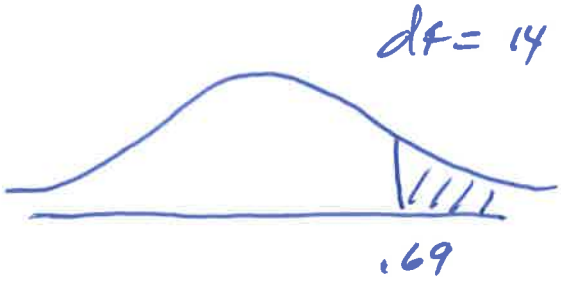
Test statistic = $\frac{\text{AV of Draws} - \text{EV for AV}}{\text{SE for AV}}$

follows Z-curve, df = 14

SE for AV = $\frac{\text{Box SD}\sqrt{15}}{15} \approx \frac{(\text{Sample SD}^+)\sqrt{15}}{15}$

$= \sqrt{\frac{15}{14}}\,(3.8)\,\frac{\sqrt{15}}{15} = 1.01$

$\frac{43.7 - 43}{1.01} = .69$



p-value ≈ 25%.

Fail to reject. The results could be due to just chance variation.