

5.1 HW #s 1, 3, 9, 13, 17, 23, 25, 31-36

① [A] POLYGRAPH WITH PROBABILITY OF FALSE POSITIVE MEANS THAT IF THE MACHINE IS USED 15.08. ON LOTS AND LOTS OF PEOPLE WHO ARE TELLING THE TRUTH, ABOUT 8% OF THE TIME, THE MACHINE WILL SAY THAT THE PEOPLE ARE LYING

[B] ANSWERS WILL VARY.

* A FALSE POSITIVE WOULD MEAN THAT A PERSON TELLING THE TRUTH, THE POLYGRAPH WOULD SAY THEY ARE LYING.

* A FALSE NEGATIVE WOULD MEAN THAT A PERSON LYING, THE POLYGRAPH WOULD SAY THEY ARE TELLING THE TRUTH

THE US JUDICIAL SYSTEM IS SET UP THAT A FALSE POSITIVE IS WORSE - THAT IS FINDING SOMEONE GUILTY (LYING) WHO IS NOT IS WORSE THAN FINDING SOMEONE NOT GUILTY (NOT LYING) WHEN FACT THEY ARE GUILTY (LYING).

"SIMPLY - IT IS WORSE TO CONVICT AN INNOCENT PERSON THAN FREING A GUILTY ONE"

③ (A) IF WE LOOK AT MANY FAMILIES WHEN BOTH THE HUSBAND AND WIFE CARRY THE GENE, IN APPROXIMATELY 25% OF THEM THE 1ST BORN CHILD WILL DEVELOP CYSTIC FIBROSIS.

(B) IF THE FAMILY HAS FOUR (4) CHILDREN THIS IS A SMALL SAMPLE THERE IS NO GUARANTEE ONE OF THEM WILL DEVELOP CYSTIC FIBROSIS. IN ORDER FOR THE PROBABILITY TO BE CLOSELY REFLECTED, THE SAMPLE MUST BE VERY LARGE.

(5.1)

- ⑨ NO, THE TV COMMENTATOR IS INCORRECTLY APPLYING THE LAW OF LARGE NUMBERS TO A SMALL NUMBER OF AT BATS FOR THE PLAYER
- ⑬ SIMULATING A .75 BASKETBALL FREE THROW PLAYER
- ① A DICE - LET 1, 2, 3 = MAKE FREE THROW
4 = MISS FREE THROW
5, 6 = IGNORE AND ROLL AGAIN
- ② TABLE D "Random digits"
LET 2-DIGIT NUMBERS 01-75 = MAKE FREE THROW
AND 00, 76-99 = MISS FREE THROW
THEN READ 2-DIGIT NUMBERS FROM TABLE D
- ③ DECK OF CARDS -
LET DIAMONDS, HEARTS AND SPADES = MAKE FREE THROW
CLUBS = MISS FREE THROW
DEAL ONE CARD FROM THE DECK.
- ⑭ ① THIS IS A LEGITIMATE SIMULATION.
THE CHANCE OF ROLLING A 1, 2, 3 IS 75%
AND THE ROLLS ARE INDEPENDENT OF EACH OTHER.
- ② THIS IS NOT A VALID SIMULATION.
THE CHANCE OF HEAD USING A FAIR COIN IS 50%
AND NOT 60% FOR THE ARCHER. THIS WILL
UNDER ESTIMATE HER PERCENT OF HITTING
THE TARGET.

19) (a) QUESTION: WHAT IS THE PROBABILITY THAT IN A RANDOM SELECTION OF 10 PASSENGERS NONE FROM 1ST CLASS ARE CHOSEN?

- (b)
- NUMBER THE 76 PASSENGERS
ASSIGN FIRST CLASS NUMBERS 01-12
ASSIGN THE OTHERS NUMBERS 13-76
 - IGNORE 00, 77-99 AND REPEATS
 - FIND 10 UNIQUE 2 DIGIT NUMBERS FROM THE GIVEN RANDOM TABLE
 - COUNT THE NUMBERS BETWEEN 01-12

(c)

71	48	7	0	9	9	8	4	2	9	0	7	7	1	4	8	6	3	6	1	6	8
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repeat repeat

3	4	7	0	5	2
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repeat

Numbers Selected - 1ST CLASS: 07

OTHER 71, 48, 70, 29, 63, 61, 68, 34, 52

Conclusion: Based on this simulation, we found 1 out of the 10 were in 1ST class.

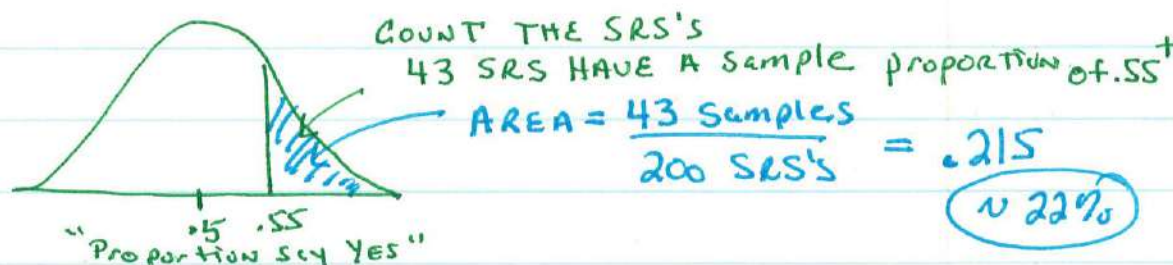
- (d) Based on 100 repetition of the simulation, we found 15 times when none of the 10 passengers were from 1ST class. Since 15% of the samples have NO 1ST class passengers, it seems plausible that this can occur and find it was reasonable that the actual selection was random.

(23)

DO TEENS RECYCLE?

- AP CLASS TOOK AN SRS OF 100 STUDENTS
- THEN USED A SIMULATION SOFTWARE CALLED FATHOM TO DO 200 SRS OF 100 STUDENTS AND THAT IS A GRAPH EACH SRS sample proportion.
- YOU ARE TOLD THE TRUE PROPORTION IS .50.

- (A) • AP STUDENTS IN THIS CASE SAID THAT 55 STUDENTS WOULD RECYCLE.
- THEREFORE THIS SAMPLE PROPORTION IS .55
 - LOOK AT THE GRAPH

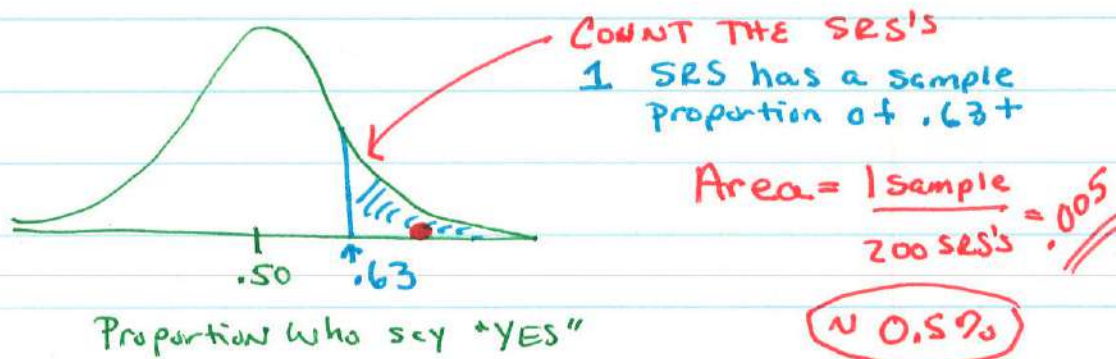


CONCLUSION: BASED ON THIS SIMULATION, WE DO NOT HAVE CONVINCING EVIDENCE THAT THE CLASS SAMPLE PROPORTION .55 (55% Recycle) IS UNUSUAL. BASED ON THE SIMULATION WE CAN SEE THAT ABOUT 22% ($\frac{43}{200}$) OF THE SRS HAVE A SAMPLE PROPORTION OF .55 STUDENTS SAY THEY RECYCLE.
 $\therefore$ 22% IS NOT PARTICULARLY UNUSUAL

23 CONT

(B) Now we are told the AP Stats class had 63 STUDENTS SAY THEY RECYCLE. 1

- THE SAMPLE PROPORTION IS NOW .63
- LOOK AT THE SIMULATION GRAPH



CONCLUSION BASED ON THE SIMULATION WE DO HAVE CONVINCING EVIDENCE that a sample proportion of .63 agree they recycle is UNUSUAL.

ONLY 1 OF THE 200 Samples (SRS's) YIELD A RESULT THAT SAY 63% of students recycle. THIS WOULD HAPPEN IN ABOUT 0.5% (less than 1%) WHICH SEEMS RATHER UNUSUAL

(25) QUESTION TO ANSWER

CREATE A SIMULATION TO ESTIMATE
"HOW MANY MEN WOULD YOU EXPECT TO
HAVE TO CHOOSE TO FIND ONE WHO
IS RED-GREEN COLOR BLIND?"

SIMULATION:

- ① USE TECHNOLOGY TO SIMULATE FINDING THE FIRST MALE THAT IS COLOR BLIND.
- ② TO SIMULATE THE 7% COLOR BLINDNESS (WHICH MEAN 7 OUT OF 100 men are color blind).
 - ASSIGN NUMBERS 1-7 AS COLOR BLIND
 - ASSIGN NUMBERS 8-100 AS NON COLOR BLIND
- ③ USE THE GRAPHING CALCULATOR Random Command RandInt NO REP (1, 100) TO GENERATE NUMBERS TO REPRESENT SELECTING MEN. EXCLUDE REPEATS AND ONLY INCLUDE NUMBERS 1-100.
- ④ FROM THIS LIST OF RANDOM NUMBERS, COUNT THE NUMBERS UNTIL YOU GET A NUMBER BETWEEN 1 and 7 (INCLUDE COLOR BLIND IN COUNT) CREATE A STEM PLOT TO RECORD THIS NUMBER "WHICH REPRESENTS THE # OF MEN UNTIL THE 1ST COLOR BLIND MALE IS FOUND.
- ⑤ REPEAT THIS PROCESS AT LEAST 25 TIMES

EVERY STUDENTS RESULTS
WILL BE DIFFERENT!



25 CONT

STEM PLOT "NUMBER OF MEN UNTIL
FOUND THE FIRST COLOR BLIND"

0	1 3 3 3 4 4 5 5 7 8
1	0 0 1 2 2 3 3 4 6 7
2	3 6
3	3
4	2
5	7

KEY 3|3 = 33

THE MEDIAN NUMBER OF
MEN IS 11 AND $\bar{x} = 14.08$.

CONCLUSION

BASED ON THIS SIMULATION, WE WOULD
SUGGEST THAT ^{WE} WOULD HAVE TO SAMPLE
ABOUT 14 MEN ON AVERAGE. THAT IS WE
WOULD CHOOSE ABOUT 13 MEN BEFORE GETTING
A COLOR BLIND MAN.

I REPEATED THIS SIMULATION:

0	2 3 5 7 7 8 8 8 9
1	0 1 2 3 4 6 7 8
2	0 1 3 4
3	1 4
4	4
5	2

MEDIAN = 13
 $\bar{x} \approx 16$

KEY 5|2 = 52

BASED ON THIS
SIMULATION, WE
WOULD HAVE TO
SAMPLE ABOUT
16 MEN TO
FIND THE FIRST
MALE THAT IS
COLOR BLIND.

15.1

31) C

32) A

33) D 00-46 = HIT (47%) 47-99 = miss

34) C 82734 71490 20467 47511 4 OUT OF 10
m m m (H) m (H) (H) m n (H)

35) C COUNT THE NUMBERS $5^+ = 12$ TIMES OUT OF 25 SIMULATIONS

36) E a = ODD/EVEN $\sim 50\%$
b = 1 OUT OF 10 $\sim 10\%$ ✓
c = 1 OUT OF 10 $\sim 10\%$ ✓