The slot machines of today are more video games than classic slot machines, but like in the above problem they have a very predictable payout. The payout for a game is how much money you win for any bet given (A.K.A . the expected value). The payout for slot machines at Cherokee is .90--meaning for every dollar gambled a person will win back 90 cents on average. Your plan is to take the Casino for a ride and win enough money to buy a brand new $159 water dehydrator. Your lucky number is 14 so you plan to make exactly 14 one hundred dollar bets and then leave.

a) What is the probability that you will win exactly 8 of your 14 $100 bets?

Oops

b) What is the probability that you win 8 or more of your bets?

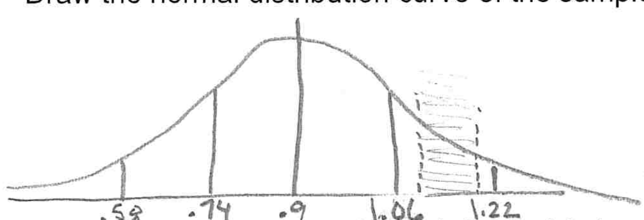
Oops

c) The standard deviation for the new "slots" is 60 cents per play.

i) What would be the standard deviation of the sample distribution for 14 bets?

$\sigma_{\hat{p}} = \frac{\sigma}{\sqrt{n}} = \frac{.60}{\sqrt{14}} = .16$ STANDARD DEVIATION for the distribution of sampl size 14 is .16 per play on slots

ii) Draw the normal distribution curve of the sample distribution of 14 bets.



iii) What is the probability I win back 1.1 to 1.2 times my bet money?

Z scores $= \frac{1.1-.9}{.16} = 1.25$ and $\frac{1.2-.9}{.16} = 1.875$

transform to % $= 89.44\%$ $= 96.99\%$

Probability I will win 1.1 to 1.2 times my bet money is $96.99\% - 89.44\% = 7.55\%$.

Slot machines at the Cherokee Casino are now video games. In the olden days slot machines consisted of three spinning wheels. The wheels had 20 symbols on them, but you only won if a bell showed up on two or more of the wheels. The 1st and third wheels had a single bell on them. The middle wheel had 9 bells on it. When you pulled the lever the wheels spun at a randomly generated speed, independently stopping on a random symbol.

a. What is the probability you win the jackpot by getting a bell on all 3 wheels?

$P(3 \text{ bells}) = P(\text{Bell wheel } 1) \cdot P(\text{Bell wheel}2) \cdot P(\text{Bell wheel } 3) =$

$\frac{1}{20} \cdot \frac{9}{20} \cdot \frac{1}{20} = .001125$

Prob of getting 3 bells on 1 pull of slots is .1125%

b. What is the probability you win the smaller prize and get exactly 2 bells?

$P(2 \text{ bells}) = P(\text{Bell on } W1+W2) + P(\text{Bell on } W2+W3) + P(\text{Bell on } W1+W3) =$

$\frac{1}{20} \cdot \frac{9}{20} \cdot \frac{19}{20} + \frac{19}{20} \cdot \frac{9}{20} \cdot \frac{1}{20} + \frac{1}{20} \cdot \frac{11}{20} \cdot \frac{1}{20} = .0404$

prob of getting exactly 2 bells on 1 pull of slots is 4.04%

c. If the payout for a Jackpot was \$100, and the payout for the smaller prize is \$20, what is a fair amount to play this game?

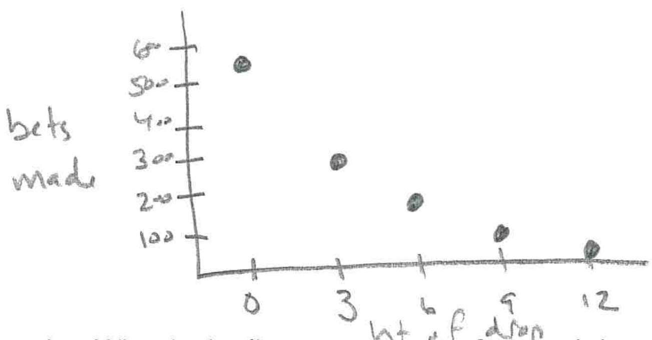
	3 bells	2 bells	≤2 bells	total
Prob	.1125%	4.04%	95.835%	100%
payout	100	20	0	—
Prob · payout	.125	.808	0	$\boxed{.933}$

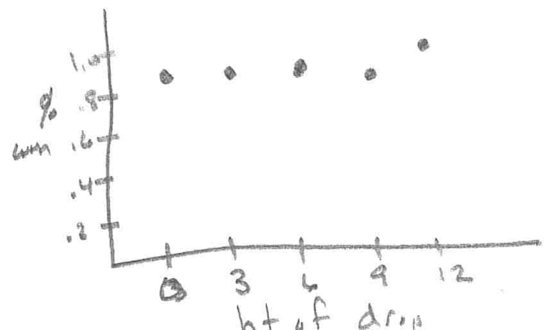
A fair amount to play for this game is 93 cents.
Anything less then that and you will make \$ on average
Anything more and you will lose \$.

After another set back from my experiment my water dehydrator seems farther away than ever. In an effort to salvage something from my study I will dive deep into the numbers.

	No recalibration	3 foot drop	6 foot drop	9 foot drop	12 foot drop
Average amount bet	$545.32	$294.72	$141.89	$67.11	$13.55
Amount won back	.89	.89	.91	.88	.97
Probability of no bets placed	.21	.34	.56	.83	.94

a. Graph the data on a scatter plot
   i. Height ball dropped vs bets made
   ii. Height of drop vs amount won back





b. What is the linear regression for graph i. and ii.? And describe the y-intercept and slope in context.

i bets = -43.04 (d) + 470.748, where d = ht of ball drop → bets = amount bet. The slope is -43.04 which means amount bet drops $43 for every foot the ball is dropped higher. $470 is y-int and bet with no recal.

ii win% = .005 d + .878, we know d + win % is % of money won back.
slope is .005. This means every foot ↑ of drop means ↑ .005 of win.

c. What is the correlation coefficient and the coefficient of determination for i. and ii.? And describe them in context.

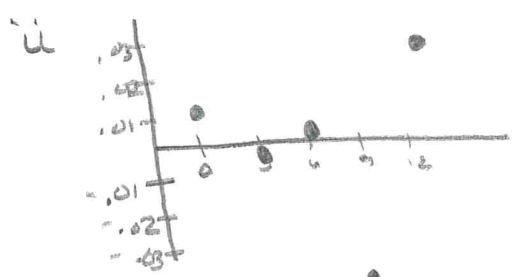
i r = -.95 + r^2 = .91 meaning there is a very strong inverse correlation between drop + amount bet

ii r = .653 + r^2 = .426 meaning there is a moderately strong correlation + 42% of win% is caused by drop height

d. Are there any outliers in i. or ii. If there are, are they influential points or high leverage points?

No

e. Create a residual plot for i. and ii. Is a linear regression appropriate for each?



Not appropriate

f. Using your data, what would you predict for a ball drop of 15 feet? Explain your findings.

After losing much, much, much money in the slots at Cherokee I have decided to develop a study to determine the best way to make money for my water dehydrator. An M.I.T. study found cognitive recalibration can be used to increase perceived luck. So, my plan is cognitively recalibrate randomly chosen individuals entering the casino. I will drop a 3 pound steel ball onto my unwitting subjects' heads from 3, 6, 9, and 12 feet. My control group will consist of randomly chosen people who will have no steel ball dropped on their head.

a. The control group had no ball dropped on their head. What information can be gained from the non-recalibrated control group that would not be gained if there was no control group?

The control group allows me to judge the change from my original betting state. WIthout a control group I would not be able to directly compair the change. This would confound my results

b. What is one advantage to using the same steel ball for every recalibration treatment?

Using the same ball removes a confounding variable. I know the ball weighs the same and has the same force on impact. Different balls may not have these characteristics and change my results.

c. What is one disadvantage to using the same steel ball each time?

Using a different ball would allow me to bonk different people at the same time. In other words the same ball increases the complexity of my expeiment and the time it will take to run it.

The results from my experiment were surprisingly disappointing and displayed below.

	No recalibration	3 foot drop	6 foot drop	9 foot drop	12 foot drop
Average amount bet	$545.32	$194.72	$71.89	$17.11	$0
Amount won back	.89	.89	.91	.88	---
Probability of no bets placed	.21	.34	.56	.93	1.0

d. From the information given would you recommend that I recalibrate myself before my next casino visit? If so, from what level? Explain your response.

I would not recommend recalibration

1st there is a very week correlation between amount bet + winning of

-.0899.