**Concepts**

* **3.1-Probability Distributions**
	+ **Finite Discrete-random variable has a limited number of values.**
	+ **Infinitely Discrete-random variable has unlimited many values.**
	+ **Continuous-random variable has values which are in an interval of real numbers.**
* **3.2-Expected Value**
	+ **Expected Value-the average, or mean, of a certain amount of numbers.**
	+ **(x)=x1\*p1+x2\*p2+x3\*p3+x4\*p4**
* **3.3-Variance & Standard Deviation**
	+ **Variance- is a measure of the spread of the data. The larger the variance, the larger the spread.**
	+ **Standard Deviation-is a measure of the spread of the data using the same units as the data.**

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* **3.4-Binomial Distribution**
	+ **Binomial Experiment has properties**
1. **# of trials in experiment is fixed**
2. **Outcomes are “success”+ “failure”**
3. **Probability of success in each trial is the same**
4. **Trials are independent of each other**
	* **Mean=E(x)=Np**
	* **Var(x)=npq**
	* **σ(x)=**$\sqrt{npq}$
* **3.5-Z-scores & Empirical Rule**
	+ **Statistics is the practice or science of collecting and analyzing numerical data in large quantities, especially for the purpose of inferring proportions in a whole from those in a representative sample.**
	+ **Characteristics of a Normal Distribution:**
1. **Symmetric with respect to the mean**
2. **Mean=median=mode**
3. **100% of the data fits under the curve**
	* **The Z-score is the number of standard deviations a value is from the mean**

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* **3.6-Applications of the Normal Distribution**

|  |  |
| --- | --- |
| **Z =**  | **xμ** |
| **σ** |

**Click on Stat > Calculators > Normal Enter the mean, standard deviation, x**

* **3.7-Simulations**

**Simulation-is a way to model random events, to closely match real world problems.**

**Since a calculator is a type of computer, it can never be truly random.**

**For this reason, we can configure our calculators to give everyone the same set of “random” data (so we can all work together!).**

**The process of calibrating our calculators in this way is called seeding.**

**Vocabulary**

* **Finite Discrete-random variable has a limited number of values.**
* **Infinitely Discrete-random variable has unlimited many values.**
* **Continuous-random variable has values which are in an interval of real numbers.**

**Problems**

1. **A class of 50 students took a 10-point science quiz. The following distribution table describes the scores:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Scores** | **60** | **70** | **80** | **90** | **100** |
| **Frequency** | **9** | **8** | **15** | **11** | **7** |

1. **Find the probability distribution**
2. **Find the mean**
3. **Find the standard deviation**
4. **Draw a histogram to represent the probability distribution**
5. **A game is considered fair when the expected value is 0. What should you pay to play a game in which you receive $10 for drawing an ace from a deck of cards, $2 for a face-card, and $1 for any other card if the game is to be a fair game?**
6. **A local marathon runner estimates that the probability he will win his next race is 0.8.**
* **What are the odds that he will win his next race?**
* **What are the odds that he will not win his next race?**
1. **A set of english exams has a mean of 86 and a standard deviation of 9. A set of social studies exams has a mean of 82 and a standard deviation of 7. Trevor scores a 91 on the english exam and Lance scores an 89 on the social studies exam. Who did better on their exams?**
2. **In a history class of 200 students at NC State, Unit 3 test scores had a mean of 85 and a standard deviation of 7. If the professor only passes the top 10% what is the minimum score to pass the test?**
3. **The probability that a marksman shooting at a target will hit a bullseye is 0.17. What is the probability that he will hit at most 2 bullseye in 10 shots?**
4. **The expected lifespan of a battery is normally distributed with a mean of 60 hours and a standard deviation of 8 hours. The manufacturer advertises that they will replace all batteries that last less than 47 hours. If 55,000 batteries were produced how many would they expect to replace ?**
5. **A normal distribution has a mean of 125 and a standard deviation of 25. For this distribution, what score corresponds to the 90th percentile?**
6. **The probability that a bowler scores a spare in each frame is .23.**
	1. **What is the probability that he will get exactly 8 spares in 10 frames?**
	2. **What is the probability that he will get at least 1 spare in 10 frames?**
7. **A distribution of scores has a standard deviation of 15. Find the Z scores corresponding to the following values:**
	1. **A score that is 30 points below the mean**
	2. **A score that is 25 points above the mean**
8. **The Piedmont surf club is considering purchasing a stock. After considerable research, the club members determine that there is a 55% chance of making $9,300, a 15% chance of breaking even, and a 30% chance of losing $7,400. Find the expected value of this purchase.**
9. **The birth weights of baby monkeys born has been found to be normally distributed with a mean of 6.2lbs and a standard deviation of 1.7lbs.**
	1. **Find the probability that the birth weight of a baby monkey is more than 7.3lbs.**
	2. **Find the probability that the birth weight of baby monkeys born is between 5.9lbs and 9.3lbs.**
	3. **Find the weight of baby monkeys born in the 80th percentile.**