How to calculate probability with normal distribution

CO-6: Â Apply basic probability concepts, random variation and distributions of commonly used statistical probability. Video: Â Standard normal distribution (4:12) LO 6.17: Â Find probability associated with a specified normal distribution. As we have seen, the standard deviation rule is very limited in helping the United States to answer questions of probability and fundamentally limited to questions involving values falling exactly 1, 2 and 3 standard deviations away from the average. How do we answer questions of probability in general? The key is the location of the average value, measured in standard deviations. We can approach the question of probability two possible ways: a table and a technology. In the next sections, you will learn how to use the standard table, â€ and how the same calculations can be done with technology. Standardization of values The first step to assess a probability associated with a normal value is to determine the relative value, compared to all other values taken from the normal variable. This is achieved by determining how many standard deviations below or above the average that the value is. How many standard deviations below or above the average length of the male foot is 13 inches? Since the average is 11 inches, 13 inches is 2 inches above the average. Since a standard deviation is 1.5 inch, this would be 2 / 1.5 = 1.33 standard deviations above the average. By combining these two passages, we could write: (13 in. Â € "11 in.) / (1.5 inches per standard deviation) = (13 â€" 11) / 1.5 Standard deviations = +1.33 Standard deviations. In the statistics language, we just found the Z score for a male foot length of 13 inches to be z = +1.33. Or, to put it another way, we standardized the value of 13. In general, the standard Z value indicates how many standard deviations below or above the average the original value is, and is calculated as follows: Z-Punteggio = (value â€ "Media) / Standard deviation The convention is to indicate a value of our normal random variable X with the letter â€ œX.Â € Notice that since the standard deviation (Sigma, ï`) is always positive, for the values of x above the average (mu, µ1⁄4), Z will be positive; For x values below average (MU, Î1⁄4), Z will be negative. We return to our foot length example and answer other questions. (a) What is the standardized value for a male foot length of 8.5 inches? How does this length of the foot relative to the average? z = (8.5 â € "11) / 1.5 = -1.67. This foot length is 1,67 standard deviations below average. (b) The standardized foot length of a man is +2.5. What is its life of the real foot in inches? If z = +2.5, its foot length is 2.5 standard deviations above average. Since the average is 11, and each standard deviation is 1.5, we get that the length of the foot of the man is: 11 + 2.5 (1.5) = 14.75 inches. Note that Z scores also allow you to compare the values of different normal random variables. Here is an example: (c) Â In general, the foot length of women is shorter than men. Suppose the length of the foot of women follows a normal distribution with an average of 9.5 inches and a standard deviation of 1.2. The length of the Ross foot is 13.25 inches and the length of the Candace foot is only 11.6 inches. Which one has a longer foot than his gender group? To answer this question, we find the Z score of each of these two normal values, bearing in mind that each of the values comes from a different normal distribution. Ross: Z-Score = (13,25 â € "11) / 1.5 = 1.5 (Rose length is 1.5 standard deviations above the average foot length for theCandace: Z-score = (11.6 Ã ¢ â,¬ "9.5) / 1.2 = 1.75 (the length of the candily foot is 1.75 standard deviations above the middle length of the foot for women). Yes Note that even if the Ross Foot is longer than the candily, the candily foot is more related to their respective genres. Comment: Part (c) above illustrates how Z scores become crucial when you want to compare distributions. "I have Obtained this?: Standardized standardized scores Finding the odds with the normal calculator and table now that you have learned to evaluate the relative value of any normal value standardizing, the next step is to evaluate the odds. In other contexts, as mentioned earlier, we take the conventional approach to the normal table for the first time, which indicates the probability of a normal variable by taking a value lower than any standardized z score. Because the normal curves are symmetrical on the average, it follows that the curve of the Z scores must be symmetrical about 0. As the total area under any normal curve is 1, it follows that the areas on both sides of Z = 0 are both 0.5. Furthermore, according to the standard deviation rule, most of the area under the standardized curve falls between Z = -3 and Z = +3. The normal table outlines the precise behavior of the normal standard random variable Z, the number of standard deviations a normal value X is lower or higher than its average. The normal table provides probability that a normal standardized normal variable would require a lower or equal value to a particular Z * value. These special values are listed in the * module. * In rows along the left margins of the table, specifying those and tenths. The columns develop these values to cents, allowing us to look for the probability of being less than any standard Z value of the module *. **. For example, in the table part shown below, we can see it for a z of -2.81 score, we would find P (Z