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Practice Quiz Questions for Chapter 3 (Solutions)

1. The normal distribution is:
   a. a discrete distribution with two parameters
   b. a binomial distribution with only one parameter
   c. a density function of a discrete random variable
   d. a continuous distribution with two parameters

2. The standard deviation σ of a probability distribution is a:
   a. measure of variability of the distribution
   b. measure of central location
   c. measure of relative likelihood
   d. measure of skewness of the distribution

3. If we plot a continuous probability distribution *f(x)*, the total probability under the curve is
   a. -1
   b. 0
   c. 1
   d. 100

4. Which of the following equations shows the process of standardizing?
   a. $E(X) = np$
   b. $Z = (X - \mu)/\sigma$
   c. $f(x) = 1 - (\sigma/\mu)$
   d. $E(Y) = \mu$

5. The standard normal distribution has a mean and a standard deviation respectively equal to
   a. 0 and 0
   b. 1 and 1
   c. 1 and 0
   d. 0 and 1

6. Given that *Z* is a standard normal random variable, $P(-1.0 \leq Z \leq 1.5)$ is
   a. 0.7745
   b. 0.8413
   c. 0.0919
   d. 0.9332

=NORMDIST(1.5,0,1,TRUE)-NORMDIST(-1,0,1,TRUE) or =NORMSDIST(1.5)-NORMSDIST(-1)
Using the tables : 0.93319 - 0.15866 = 0.77453

7. Given that *Z* is a standard normal variable, the value *z* for which $P(Z \leq z) = 0.2580$ is
   a. 0.70
   b. 0.758
   c. -0.65
   d. 0.242

=NORMINV(0.258,0,1) or =NORMSINV(0.258) or you can use the tables. You will find at -0.65, z is 0.25785

8. Given that the random variable *X* is normally distributed with a mean of 80 and a standard deviation of 10, $P(85 \leq X \leq 90)$ is
   a. 0.5328
   b. 0.3413
   c. 0.1915
   d. 0.1498

   =NORMDIST(90,80,10,TRUE)-NORMDIST(85,80,10,TRUE)
   Or you can standardize the problem as P(0.5<Z<1)=? And solve it using the tables or using Excel using this formula =NORMDIST(1,0,1,TRUE)-NORMDIST(0.5,0,1,TRUE) or =NORMSDIST(1)-NORMSDIST(0.5) or using the table: 0.84134 – 0.69146 = 0.14988

9. A random variable *X* is normally distributed with a mean of 175 and a standard deviation of 50. Given that *X* = 150, its corresponding *Z*- score is –0.50 **T** / F (150-175)/50 = -25/50 = -0.5

10. A random variable *X* is normally distributed with a mean of 175 and a standard deviation of 50.
    a. What is the P(X = 150)? **0**

b. What is P(X> 200)? In other words what is P(Z>0.5) = 1-NORMSDIST(0.5) = **0.308538**
or =1-NORMDIST(200,175,50,TRUE)= **0.308538** or using the table, **1 – 0.69146 = 0.30854**

c. What is P(X < 190)? **0.617911** in other words what is P(Z < 0.3) using Using Excel:
=NORMDIST(190,175,50,TRUE) or NORMSDIST(15/50)
Or using the table for z = 0.3, the answer is **0.61791**

d. What is P(160 < X < 195)?
0.273333 using =NORMDIST(195,175,50,TRUE)-NORMDIST(160,175,50,TRUE)
or =NORMSDIST(20/50)-NORMSDIST(-15/50)
Or using the table, for z = 0.4 and -0.3 0.65542-0.38209 = **0.27333**

e. What is P(X < 100)? **0.066807** using =NORMDIST(100,175,50,TRUE) or =NORMSDIST(-75/50)
Or using the table for z = -1.5 **0.06881**

11. If I want to give an award to the top 5% of contestants and if the scores received by the contestants followed normal distribution with a mean of 250 and a standard deviation of 28 then at what minimum score will I give the award?
    a. 278
    b. 306
    c. 296 =NORMINV(0.95,250,28)
    d. Cannot be answered from the given information. Will need to know how many contestants there were.
    Using the table we will find z at 0.95 = 1.65
    The score at 1.65 std. dev. = 250 + 1.65*28 = 250 + 46.2 = 296.2
12. Given that *Z* is a standard normal variable, the value *z* for which $P(Z \leq z) = 0.7580$ is
    a. 0.7
    b. 0.758
    c. -0.65
    d. 0.242
    Using the formula =NORMINV(0.758,0,1) or =NORMSINV(0.758)
13. The height of a probability distribution curve for a continuous random variable is a measure of the probability. T / F
14. What is P(t > 2.0) if t is a random variable with a t-distribution with 15 deg. Of freedom.
    Using table in Figure 14, the answer is 1 minus 0.96803 = **0.03197**
15. What is P(t < 2.0) if t is a random variable with a t-distribution with 20 deg. Of freedom.
    Using table in Figure 14, the answer is 0.97037
16. What is t0 if P(t > t0) = 0.05, where t is a random variable with a t-distribution with 20 deg. Of freedom.
    Using table in Figure 15, the answer is 1.725
17. Which of the following distributions is discrete?
    a. Uniform
    b. Normal
    c. Binomial
    d. Exponential
18. Which of the following distributions is continuous?
    a. Uniform

b. Poisson
c. Binomial
d. Hypergeometric

19. Identify this type of random variable: Number of fish you catch per day.
    a. Binomial b. Poisson c. Hypergeometric d. Normal

20. Identify this type of random variable: Number of days out of ten days that you catch at least one fish, given that catching at least one fish a day is considered a success.
    a. Binomial b. Poisson c. Hypergeometric d. Normal

21. What is the probability that you will catch at least one fish a day for 5 out of 10 days if the probability of catching at least one fish a day is 0.8?
    This is a binomial variable, with number of trials n = 10 and number of successes = 5 and the probability of success 0.8 and we want probability at 5, not the cumulative probability.
    =BINOMDIST(5,10,0.8,FALSE) = 0.026424

22. If the average number of you can catch per day is 3, what is the probability that on a given day you will catch 4 fish?
    This is a Poisson variable, with the mean of 3
    =POISSON(4,3,FALSE) = 0.168031

23. If the average number of fish you can catch per day is 3, what is the probability that on a given day you will catch more than 4 fish?
    =1-POISSON(4,3,TRUE) = 0.1847

24. If the average number of you can catch per day is 3, what is the probability that on a given day you will catch fewer than 4 fish?

    =POISSON(3,3,TRUE) = 0.647232

25. If I draw 4 balls from a hag that has 3 yellow and 8 red balls, what is the probability that 2 of the 4 balls that I draw will be red?

    (8C2)(3C2) /(11C4) = combin(8,2)*combin(3,2)/combin(11,4) = 0.2545

    Also =HYPGEOMDIST(2,4,8,11)=0.2545