Researchers from the U.S. Centers for Disease Control and Prevention found that children and teens are now getting less caffeine from soda, but more from caffeine-heavy energy drinks and coffee. According to the study, 73 percent of American children consume some level of caffeine each day. We will select a random sample of 10 children and count \( X \) = the number in the sample who consumed caffeine the previous day.

1. What is the distribution of \( X \)?
   a) Normal (7.3, 1.4)  
   b) Binomial (7.3, 1.4)  
   c) Normal (10, 0.73)  
   d) Binomial (10, 0.73)

2. \( X \) is considered a(n) \( \boxed{\text{discrete}} \) random variable.
   a) continuous  
   b) discrete  
   c) categorical  
   d) statistical  
   e) inferential

3. The probability that none of the children in the sample consumed caffeine the previous day is:
   a) zero  
   b) \((0.73)^{10}\)  
   c) \(1 - (0.73)^{10}\)  
   d) \((0.27)^{10}\)  
   e) \(1 - (0.27)^{10}\)

4. Find the probability that exactly seven children in the sample consumed caffeine the previous day.
   a) zero  
   b) 0.26  
   c) 0.11  
   d) 0.02  
   e) 0.31

\[ P(7) = \binom{10}{7} (0.73)^7 (0.27)^3 = \binom{10}{7} \frac{10!}{7!3!} \frac{10 \times 9 \times 8 \times 7^6}{3 \times 2} = 0.26 \]

5. Find the probability that at least one of the children in the sample consumed caffeine the previous day.
   a) exactly zero  
   b) almost zero  
   c) exactly one  
   d) almost one  
   e) exactly 73%

\[ P(\text{at least one}) = 1 - P(0) = 1 - (0.27)^{10} \approx 1 \]

6. How many children out of the 10 in the study do you expect would have consumed caffeine the previous day?
   a) about 10  
   b) about 1  
   c) about 7  
   d) about 3  
   e) about 5

\[ \mu = n \cdot P = 10 \cdot 0.73 = 7.3 \]

7. Even preschool children consume caffeine, mostly via soda, tea or chocolate-flavored milk. On average, preschool-aged kids are consuming about 10 milligrams of caffeine a day (equivalent to less than one-third of a can of caffeinated cola), but some of them consume more than 60 milligrams of caffeine every day. Which is the most reasonable guess for the distribution of caffeine consumption in preschoolers?
   a) Bimodal distribution with mean 10 mg and standard deviation 6 mg.  
   b) Normal distribution with mean 10 mg and unknown standard deviation.  
   c) Binomial distribution with mean 10 mg and standard deviation 1.4 mg.  
   d) Skewed Right distribution with mean 10 mg and unknown standard deviation.  
   e) Uniform distribution between 0 mg and 60 mg.
The wing spans of recently cloned monarch butterflies follow a normal distribution with mean 9 cm and standard deviation 0.75 cm.
8. The mean and standard deviation given in this problem are:
   a) both parameters   b) a statistic and a parameter, respectively
   c) both statistics   d) a parameter and a statistic, respectively  e) both unbiased

9. What proportion of the butterflies has a wingspan less than 8 centimeters?
   a) 0.1210
   b) 0.8413
   c) 0.0918
   d) 0.1587
   e) 0.9082

10. What proportion of the butterflies has a wingspan wider than 10 centimeters?
    a) 0.1210
    b) 0.8413
    c) 0.0918
    d) 0.1587
    e) 0.9082

11. Ten percent of the butterflies have a wingspan wider than how many centimeters?
    a) 9.90
    b) 8.90
    c) 9.10
    d) 10.28
    e) 9.96

12. A different species of butterflies also has wingspans that are normally distributed with a standard deviation of 0.75 inches but unknown mean. However, we know that the wingspan for the smallest 5% of butterflies is 5.7 cm or less. What is the average wingspan for this species?
    a) 6.45 cm
    b) 5.41 cm
    c) 5.74 cm
    d) 7.35 cm
    e) 6.93 cm

13. A third species of butterflies was used to measure the following wingspans on eight butterflies. Estimate the standard deviation of their distribution. 9.26, 7.51, 10.04, 8.62, 8.35, 8.91, 8.12, 7.88
    a) 0.31625 cm     b) 0.10733 cm
    c) 0.75858 cm     d) 0.81096 cm
    e) 0.87750 cm

Can duct tape be used to remove warts? A study randomly assigned 51 patients with warts to receive either duct-tape therapy (covering the wart with a piece of duct tape) or cryotherapy (freezing a wart with liquid nitrogen). After two months warts were removed in 85% of the duct tape group and 60% of the cryotherapy group.

14. This is an example of:
    a) a matched pairs design  b) an experiment  c) an observational study  d) a double blind study

Identify the following:
15. Experimental Unit(s) a) therapy
16. Response Variable(s) b) duct tape and cryotherapy
17. Factor(s) c) patients
18. Treatment(s)  d) wart removed or not
e) 85% and 60%
A recent survey conducted in a Statistics course at UF asked students for their gender, and whether they texted while driving. The results appear on the table below.

Match the following probabilities from the table with the correct description. The probability that someone:

| 19. who is a male never texts while driving |
| 20. who is a student that never texts while driving is male |
| 21. is a male and never texts while driving |
| a) 11/34 |
| b) 11/38 |
| c) 38/203 |
| d) 11/203 |
| e) 34/203 |

22. If we want to extend the conclusions from this survey to all UF students, this sample would be considered:

a) appropriate because all participants are UF students
b) appropriate because it is a simple random sample of UF students
c) inappropriate, because even though it is a random sample, it’s not a simple random sample
d) inappropriate, because it’s a convenience sample that could be biased
e) inappropriate because 203 students is not representative of all UF students

23. Which of the following best describes the relationship between gender and texting habits?

a) The proportion of females who said they text while driving is higher than the proportion of males.
b) The proportion of males who said they text while driving is higher than the proportion of females.
c) The number of females who said they text while driving is higher than the number of males.
d) The number of males who said they text while driving is higher than the number of females.

Can you make money from the lotto? We have data on 254 consecutive daily “pick it” lottery run by the state of New Jersey. In the game, each player selects a three digit number between 000 and 999. A winning number is selected by randomly picking one of 10 balls (numbered 0-9) from each of three containers. All players who hold the winning numbers split the prize money for the game, so the size of the prize depends on the number of players who choose the winning number. The boxplots show the distribution of the amount of money won by each player (winning payoff), depending on the first number (leading digit) of their pick.

24. The highest payoff during these 254 days was around:

a) $400  b) $700  c) $900  d) $600  e) $500

25. Overall, the chances of winning a larger prize are better if your pick starts with:

a) 4  b) 7  c) 0  d) 1  e) 6

26. The median payoff for picks that start with the number 5 is approximately:

a) $100  b) $700  c) $300  d) $400  e) $500

27. The IQR of payoffs for picks that start with the number 1 is approximately:

a) $100  b) $700  c) $300  d) $400  e) $500

28. Which of the following is the most reasonable estimate for the average payout of this “pick it” lottery?

a) $100  b) $300  c) $500  d) $700  e) $900
Gallup polls show smoking rates are currently at their lowest in the US with 20% of adults say they smoked a cigarette "in the past week". They have tracked behavior since 1944 and noted a long, slow decline in since the 1970s. In recent years, smoking rates have fallen particularly sharply among young adults (ages 18 to 29). Data from 23 years in this time period was used to conduct a regression analysis. The equation obtained was:
\[ \%\text{smokers} = 802.33 - 0.388\, \text{year}, \text{ with an } R^2 = 88\% \]

29. Find the correlation between \%smokers and year for this data set.
   a) 9.4
   b) -0.94
   c) 0.94
   d) -0.88
   e) 0.88

30. Use the regression equation to predict the \%smokers in 2014.
   a) 20.9
   b) 19.6
   c) 18.9
   d) 15.8
   e) 7.56

31. Which of the following is the best interpretation of the slope?
   a) As smoking increases by 1\% we predict that the cost of cigarettes will decrease by 38 cents.
   b) As smoking increases by 1\% the number of smokers increases by 802.33 on average.
   c) Each year we expect the percentage of smokers will decrease by 0.388\%.
   d) Each year smoking decreases by 802.33 people on average.

32. Which of the following is the best interpretation of the intercept?
   a) 80.2\% of people smoked in 1944.
   b) 38.8\% of people smoked when the year was zero.
   c) We should not interpret because it would be considered extrapolation.
   d) We should not interpret because it would be considered misuse of cause and effect.
   e) 0\% of people smoked in the year 802.

33. The residual for the year 1944 will be:
   a) positive because the predicted value is higher than the observed value.
   b) negative because the predicted value is lower than the observed value.
   c) positive because the \%smokers that year was higher than the average.
   d) negative because the year was at the beginning of the time period used in the study.
   e) zero because the true \%smokers that year is known and does not need to be estimated.

\[ \text{EVERYONE WILL GET CREDIT FOR THIS QUESTION} \]