Review Session – AP Statistics – Unit 5 (Probability)

1. A person has a 10 percent chance of winning the daily office lottery. What is the probability she first wins on the fourth day?

A.) $(4)(.10)^3(.90)$ B.) $(.10)(.90)^3$ C.) $(.10)^3(.90)$ D.) $(.10)^3(.90)^3$

E.) None of the above gives the correct probability.

2. Suppose that the probabilities than an answer can be found on Google is .95, on Answers.com is .92, and on both Web sites is .874. Are the possibilities of finding the answer on the two websites independent?

A.) Yes, because (.95)(.92) = .874. B.) No, because (.95)(.92) = .874. C.) Yes, because .95>.92>.874.

D.) No, because .5(.95+.92).874. E.) There is insufficient information to answer this question.

3. The following is from a mortality table of 10,000 people. What is the probability that a 20-year-old survived to be 60?

Age	0	20	40	60	80
Number Surviving	10,000	9,700	9,240	7,800	4,300

A.) 0.1959 B.) 0.4419 C.) 0.7800 D.) 0.8041 E.) 0.9700

4. *Hardest one.* A travel agent books passages on three different tours, with half her customers choosing tour T_1, one-third choosing T_2, and the rest choosing T_3. The agent has noted that three-quarters of those who take tour T_1 return to book passage again, two-thirds of those who take T_2 return, and one-half of those who take T_3 return. If a customer does return, what is the probability that the person first went on tour T_2?

A.) ⅓ B.) ⅔ C.) 2/9 D.) 16/49 E.) 49/72

5. There are five outcomes to an experiment and a student calculates the respective probabilities of the outcomes to be .34, .50, .42, 0, and -.26. The proper conclusion is that

A.) The sum of the individual probabilities is 1.
B.) One of the outcomes will never occur.
C.) One of the outcomes will occur 50 percent of the time.
D.) All of the above are true.
E.) The student made an error.

6. There are two games involving flipping a fair coin. In the first game, you win a prize if you can throw between 45 percent and 55 percent heads; in the second game, you win if you can throw more than 60 percent heads. For each game, would you rather flip the coin 30 times or 300?

A.) 30 times for each game
B.) 300 times for each game
C.) 30 times for the first game, and 300 for the second
D.) 300 times for the first game, and 30 for the second
E.) The outcomes of the games do not depend on the number of flips.

7. According to one poll, only 8 percent of the public say they “trust Congress.” In a simple random sample of ten people, what is the probability that at least one person “trusts Congress”?

A.) .188 B.) .378 C.) .434 D.) .566 E.) .622

If you flip a fair coin three times.....

Let A = {Obtain at least 2 H's}

B = {Obtain exactly 2 H's}

C = {All flips identical}

8. P(A)

9. P(B)

10. P(C)

11. $P(A^C)$

12. $P(B^C)$

13. $P(C^C)$

14. $P(A\cap B)$

15. $P(A\cap C)$

16. $P(B\cap C)$

17. $P(A\cup B)$

18. $P(A\cup C)$

19. $P(B\cup C)$

20. P(A|B)

21. P(B|A)

22. P(A|C)

23. P(C|A)

24. P(B|C)

25. P(C|B)

Athletes are often tested for use of performance-enhancing drugs. Drug tests aren't perfect – they sometimes say that an athlete took a banned substance when that isn't the case (a "false positive"). Other times, the test concludes that the athlete is "clean" when he or she actually took a banned substance (a "false negative"). For one commonly used drug test, the probability of a false negative is 0.03, and the probability of a false positive is 0.09. A random survey (World Anti-Doping Agency, 12/22/2008) of 21,849 professional athletes from 1968-2008 found that 0.49% of professional athletes use/used banned substances.

26. Make a tree diagram of this situation.

27. What is the probability that a randomly selected athlete tests positive for drugs?

28. What is the probability that an athlete is guilty of taking performance-enhancing drugs, given that they tested positive for drugs?

1. B. To win on the 4th day you have to fail (90%) and fail (90%) and fail (90%) and then succeed (10%).
2. A. Make a Venn diagram. Don't forget to subtract the overlap from the totals of both circles.
3. D. Out of the 9700 twenty-year-olds, 7800 of them survived to be sixty. Do 7800/9700.
4. D. This is a tough one. Make a tree with three branches for the three plans, then for each of the three branches, make two branches for "return" or "not return". Multiply through, then add together the three "return" probabilities for your denominator, and put the "return from T2" probability on top.
5. E. Probabilities can't be negative!
6. D. In the first game, you want what is typical or normal, so a large sample size will flatten out the probability and make 50% more likely. In the second game, you want what is atypical or abnormal (>60%), so you want a smaller sample size wherein you get more variability, and weird stuff happens more often.
7. D. To calculate the probability of at least one success out of ten trials, find the probability of complete failure (10 failures in a row), then one-minus it. So you'd do $1-(0.92)^{10}$.

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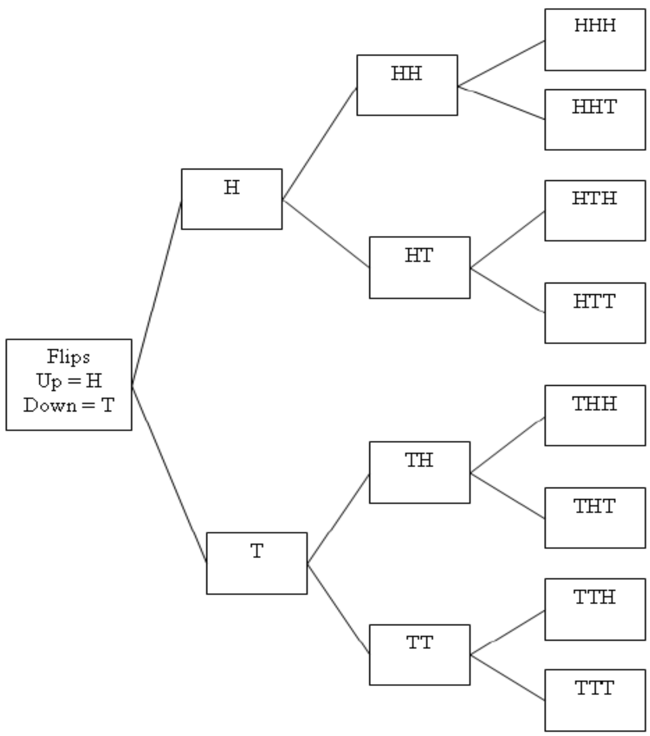
8. 4/8
9. 3/8
10. 2/8
11. 4/8
12. 5/8
13. 6/8
14. 3/8
15. 1/8
16. 0/8
17. 4/8
18. 5/8
19. 5/8
20. 3/3
21. ¾
22. ½
23. ¼
24. 0
25. 0



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26. See diagram →

27. 0.00475 + 0.0896 = 0.09435

28. 0.00475/0.09435 = 0.0503