AFM: Probability Review **Name:** KEY

For questions 1-8, one card is selected from a deck of cards. Find the following:

1. P(black card)

$\frac{26}{52} = \boxed{\frac{1}{2}}$

2. P(spade or a face card)

$\frac{13}{52} + \frac{12}{52} - \frac{3}{52} = \frac{22}{52} = \boxed{\frac{11}{26}}$

3. odds in favor of picking a face card

12 : 40

$\boxed{3:10 \text{ or } 3/10}$

4. odds against picking a queen

48 : 4

$\boxed{12:1 \text{ or } \frac{12}{1} = 12}$

5. P(diamond or a even number card)

$\frac{13}{52} + \frac{20}{52} - \frac{5}{52} = \frac{28}{52} = \boxed{\frac{7}{13}}$

6. odds **against** picking a spade

not spade : spade

39 : 13 $\boxed{3:1 \text{ or } \frac{3}{1} = 3}$

7. P(a face card or a number greater than 5)

6 7 8 9 10

$\frac{12}{52} + \frac{20}{52} = \frac{32}{52} = \boxed{\frac{8}{13}}$

8. P(a queen or a red card)

$\frac{4}{52} + \frac{26}{52} - \frac{2}{52} = \boxed{\frac{7}{13}}$

A box contains 10 jellybeans: 4 red, 3 blue, 2 yellow and 1 orange. You are to pick *TWO* jellybeans out of the box. Find the probability of selecting:

9. a red then a yellow (**WR**) order matters

$\frac{4}{10} \cdot \frac{2}{10} = \frac{8}{100} = \boxed{\frac{2}{25}}$

10. two blue (blue then blue)(**WOR**) order matters

$\frac{3}{10} \cdot \frac{2}{9} = \frac{6}{90} = \boxed{\frac{1}{15}}$

11. at least one blue(**WOR**) 1 − P(no blues)

$1 - \left(\frac{7}{10} \cdot \frac{6}{9}\right)$

$1 - \frac{7}{15} = \boxed{\frac{8}{15}}$

12. red and yellow (**WOR**) order doesn't matter

$\frac{4}{10} \cdot \frac{2}{9} \cdot \frac{2!}{0!} = \frac{16}{90} = \boxed{\frac{8}{45}}$

13. orange then red (**WR**) order matters

$\frac{1}{10} \cdot \frac{4}{10} = \frac{4}{100} = \boxed{\frac{1}{25}}$

14. a blue and a yellow (**WOR**) order doesn't matter

$\frac{3}{10} \cdot \frac{2}{9} \cdot \frac{2!}{0!} = \boxed{\frac{2}{15}}$

Pick *THREE* jellybeans from the box above (WITHOUT REPLACEMENT):

15. red and yellow and yellow order doesn't matter

$\left(\frac{4}{10} \cdot \frac{2}{9} \cdot \frac{1}{8}\right) \cdot \frac{3!}{2!} = \boxed{\frac{1}{30}}$

16. at least one blue 1 − P(no blue)

$1 - \left(\frac{7}{10} \cdot \frac{6}{9} \cdot \frac{5}{8}\right)$

$1 - \frac{7}{24} = \boxed{\frac{17}{24}}$

17. an orange, then yellow, then blue order matters

$\frac{1}{10} \cdot \frac{2}{9} \cdot \frac{3}{8} = \boxed{\frac{1}{120}}$

18. Ms. Norris gives a multiple-choice test with 6 questions. Each question has 5 choices. Find the probability of getting **exactly** 3 questions correct.

binompdf(6, .2, 3) = .08192

19. Ms. Norris gives a true-false test with 10 questions. Find the probability of getting **at least** 7 right.

0-6	7-10

1 − binomcdf(10, .5, 6) = .171875

20. There are 5 prizes in the new boxes of Lucky Charms. How many boxes will you have to buy to get all 5 prizes?

1st prize: $\frac{1}{5/5}$ 2nd prize: $\frac{1}{4/5}$ 3rd prize: $\frac{1}{3/5}$ 4th prize: $\frac{1}{2/5}$ 5th prize: $\frac{1}{1/5}$

$1 + \frac{5}{4} + \frac{5}{3} + \frac{5}{2} + 5 = 11.4167$ 12 boxes

21. You pay \$2 to play a game. Four coins are flipped. If you get all HEADS, then you win \$5, and otherwise you lose. What is the expected value for you? What is the fair price to roll?

4 HEADS in a row: $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{16}$

$EV = \frac{1}{16}(\$3) + \frac{15}{16}(\$-2) = -1.69$ FP = 2 + −1.69 = .31

22. Six thousand raffle tickets are sold for \$5 each. There is a grand prize of \$2500. If Ronald buys one ticket, what is the expected value?

$EV = \frac{1}{6000}(\$2495) + \frac{5999}{6000}(-\$5) = \$-4.58$

23. Ms. Norris chooses 7 out of her 36 students to receive a free homework pass. What are the odds of receiving a free homework pass?

s : f 7 : 29 or $\frac{7}{29}$

24. The odds AGAINST catching Bieber Fever are 8:4. What is the probability that you WILL catch Bieber Fever?

odds in favor: 4:8

prob. = $\frac{4}{12} = \frac{1}{3}$

AFM: Probability Review **Name:**

25. Christina is the star player of the Duke soccer team. In the past year, she has scored 80% of her shots on goal. If she shoots the ball 11 times during the championship game, what is the probability that she will score AT LEAST 4 goals? 0 - 3 | 4 - 11

1 - binomcdf(11, .8, 3) = .999765

26. On a multiple choice test you get 4 pts for a correct answer and lose 1 point for each wrong answer. If each problem has 4 answer choices and you don't know the answer, should you guess?

$EV = (\frac{1}{4})(4) + \frac{3}{4}(-1) = .25$ you should guess!

Use the chart to answer questions 26-30. You select one person who has taken the written drivers test.

	Pass	Fail	Total
Men	50	30	80
Women	40	20	60
Total	90	50	140

27. P(woman) $\frac{60}{140} = \frac{3}{7}$

28. P(fail) $\frac{50}{140} = \frac{5}{14}$

29. P(*woman* | *passed*) $\frac{40}{90} = \frac{4}{9}$

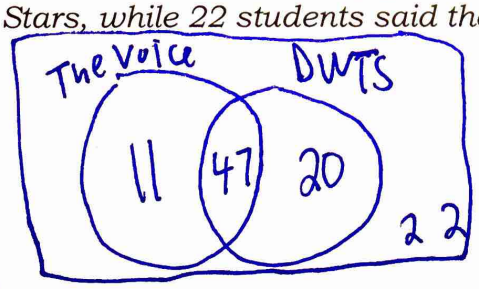
30. P(*failure* | *man*) $\frac{30}{80} = \frac{3}{8}$

31. P(*man* | *passed*) $\frac{50}{90} = \frac{5}{9}$

32. P(*woman* | *failed*) $\frac{20}{50} = \frac{2}{5}$

33. *Create a Venn Diagram based on the following information:*
Of her 100 students, 58 said that they enjoy watching The Voice and 67 said they like watching Dancing with the Stars, while 22 students said they don't watch either show. 58+67+22 = 147

147 − 100 = 47



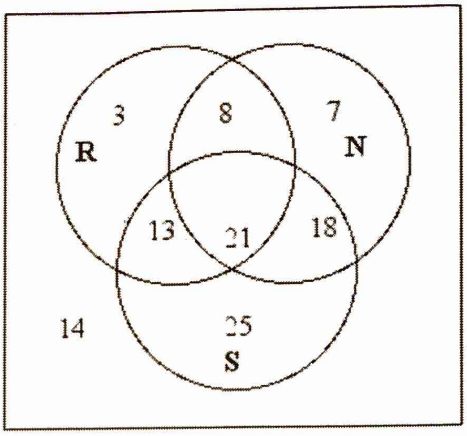
34. P(*the voice* | *not dancing*) $\frac{11}{33} = \frac{1}{3}$

35. P(*neither* | *not the voice*) $\frac{22}{42} = \frac{11}{21}$

36. P(*dancing* | *the voice*) $\frac{47}{58}$

37. P(*the voice* | *dancing*) $\frac{47}{67}$

A total of 109 deer were surveyed about activities that they enjoy. The results are summarized in the Venn diagram below.



R: enjoy running
N: enjoy nibbling
S: enjoy staring into headlights

38. $P(ONLY\ enjoys\ nibbling)$ $\frac{7}{109}$

39. $P(does\ not\ enjoy\ running)$ $\frac{64}{109}$

40. $P(enjoy\ nibbling|enjoy\ running)$ $\frac{29}{45}$

41. $P(enjoy\ running|enjoy\ staring\ into\ headlights)$ $\frac{34}{77}$

42. $P(enjoy\ staring\ into\ headlights|not\ nibbling)$ $\frac{38}{55}$

43. The probability of getting a yearbook printed upside down is 2%. Find the probability of getting one damaged yearbook in an order of 50 yearbooks.

binompdf(50, .02, 1) = ~~.000178~~ .3716

You pick a single card from a standard deck of 52 cards.

44. P(red number card)

$\frac{18}{52} = \frac{9}{26}$

45. P(red card or number card)

$\frac{26}{52} + \frac{36}{52} - \frac{18}{52} = \frac{11}{13}$

46. P(face card or spade)

$\frac{12}{52} + \frac{13}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26}$

48. P(even number or red card)

$\frac{20}{52} + \frac{26}{52} - \frac{10}{52} = \frac{36}{52}$

$\frac{9}{13}$

49. P(jack or black card)

$\frac{4}{52} + \frac{26}{52} - \frac{2}{52} = \frac{28}{52}$

$\frac{7}{13}$

50. P(odd or even number)

$\frac{16}{52} + \frac{20}{52} = \frac{36}{52}$

$\frac{9}{13}$