# MA 207 Exam 2 Review Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

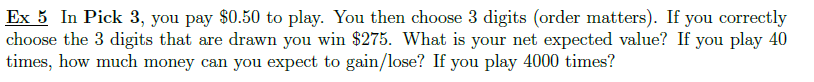
1. Applications for a driver’s license (which includes an exam) in a certain city are either satisfactory (S) or declined (D). Applicants are also asked to report on whether they completed driver’s education training—yes (Y) or no (N). The contingency table below summarizes the data. Give answers as fractions and as decimals to three decimal places.

|  |  |  |
| --- | --- | --- |
|  | Satisfactory (S) | Declined (D) |
| Completed training (Y) | 59 | 5 |
| Did not complete (N) | 61 | 7 |

1. Find P(S).
2. Find P(S|Y).
3. IS P(S) = P(S|Y): Yes or no? No explanation is needed for this part.
4. Complete the definition: S and Y are independent events if…
5. Are S and Y independent events: Yes or no?
6. Find P(Y).
7. Using the table (rather than a probability rule), find P(Y and S).
8. Find P(Y)P(S). (Hint: just multiply two fractions you have already found. Do not round intermediate calculations.)
9. Is P(Y and S) = P(Y)P(S): Yes or no? Why doesn’t this violate the Multiplication Rule for Independent Events?
10. State the Multiplication Rule (that always works, not the one that only works for independent events).
11. Using the multiplication rule, find P(Y and S). Did you get the same answer as part (g)? Yes or no?
12. Find P(Y|S).
13. Is P(S|Y) = P(Y|S): Yes or no? Would you expect them to be equal?
14. Complete the following definition: S and Y are disjoint events if…
15. Are S and Y disjoint events? Why or why not?
16. Find P(Y or S).
17. Are S and D disjoint events? Why or why not?
18. Find P(S or D).
19. Find P(YC).
20. You have a standard deck of 52 cards (no jokers). The deck has 4 suits in all—two red suits (hearts and diamonds) and two black suits (spades and clubs). Each suit has 13 ranks (ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, jack, queen, king).
    1. Find the probability that you draw one card and it is a heart.
    2. Find the conditional probability that you draw one card and it is a heart, given that it is a red card.
    3. Are the events of drawing a heart and drawing a red card independent? Yes or no?
    4. Are the events of drawing a heart and drawing a red card disjoint? Yes or no?
    5. Are the events of drawing a queen and drawing an ace independent? Yes or no?
    6. Are the events of drawing a queen and drawing an ace disjoint? Yes or no?
    7. Are the events of drawing a heart and drawing an ace independent? Yes or no?
    8. Are the events of drawing a heart and drawing an ace disjoint? Yes or no?
    9. Is it possible for two events two be both disjoint and independent? Yes or no?
    10. Find the probability that you draw one card and it is a heart and an ace.
    11. Find the probability that you draw one card and it is a heart or an ace.
    12. Find the probability that you draw three cards without replacement and none of them are hearts.
    13. Find the probability that you draw three cards without replacement and at least one is a heart.
21. The price of gas  was recorded on a particular day at a random sample of gas stations and found to be approximately normal with a mean of $2.50/gal and a standard deviation of $0.25/gal. Include units in your answers whenever appropriate.
22. What percent of gas stations charged less than 3 dollars per gallon? Make and label a drawing and shade an appropriate region.
23. What percent of gas stations charged less than $2.40/gal? Make and label a drawing and shade an appropriate region. Give your answer as a decimal to four decimal places.
24. What percent of gas stations charged between $2.40/gal and $3.00/gal? Make and label a drawing and shade an appropriate region. Give your answer as a decimal to four decimal places.
25. What was the price of gas at a station with *z*-score of 3? Include units.
26. What is the probability that a station had a price cheaper than 3 standard deviations below the mean? Give your answer to 4 decimal places.
27. How much did gas cost at a station in the 3rd percentile? Make and label a drawing and shade an appropriate region. Interpret your answer (explain what your answer means in the context of the original problem using a complete sentence with correct grammar and punctuation that includes units).
28. A student earned the scores below on various course components that make up the stated percentage of the grade.

|  |  |  |
| --- | --- | --- |
| Course Component | Percent of Course Grade | Student’s Score |
| Exams | 60% | 82 |
| Homework | 15% | 98 |
| Project | 5% | 85 |
| Final Exam | 20% | 79 |

* 1. Find the course grade, which is the mean (weighted average) of the scores (also called the expected value).
  2. Find the grade the student would have needed to earn an B+ (87%).



6. The scatter plot below shows number of full-time faculty members (in thousands) at four year colleges in certain years, together with the equation of the least squares regression line and the value of .

* 1. What is the explanatory variable?
  2. What is the response variable?
  3. Describe the overall pattern (form, direction, strength) and any striking deviations from the overall pattern (regression outliers). [Hint: form is linear or nonlinear, direction is positive or negative, strength is strong or weak. There are no hints on the exam.]
  4. In a complete sentence, explain what the value of  means in the context of this problem. Be sure to include the actual value of  in your explanation.
  5. Does the passage of time (an increase in the year) *cause* an increase in the number of faculty?
  6. What does the regression line predict for 2007? Give your answer to two decimal places and include units. Show your work using the equation of the regression line. Is this extrapolation: Yes or no?
  7. Estimate the actual value in 2007 from the scatter plot. Include units.
  8. What is the residual for 2007? Include units.
  9. What is the *y*-intercept, including units? Explain what this means in a complete sentence in the context of this problem. Does this make sense in this context?
  10. What is the slope, including units? Explain what this means in a complete sentence in the context of this problem.
  11. According to the regression line, during what year will there be 1,100,000 faculty members? Show your work using the equation of the regression line. Give your answer to the nearest year. Is this extrapolation: Yes or no?