

Prerequisite Review Sheet for MATH 1342, Elementary Statistics

Most college-level math courses use some, but not absolutely all, of the skills students have developed in the earlier math classes. The point of this review is to illustrate the types of important prerequisite skills which are the most challenging for students in this course.

Topics:

- Reading technical material: In reading technical material, often changes in just one word or even the order of the words, can make a difference in the meaning. Students must learn when and how to read carefully in this manner.
- Percentages
- Geometry and areas
- Plugging in numbers into formulas
- Rounding, exponents, mathematical notation.
- Solving equations: linear and proportional equations
- Formula for a straight line: Interpreting the coefficients, using the formula, graphing.

How should I work the problems and grade them?

Work through the problem list, checking your results in the brief answer key, and, if you can't see how to work it from there, look in the answer key with commentary for more help. Evaluate your understanding of each of the 27 problems by choosing one of these four descriptions. Keep track of your work in the grid below by checking one square for each problem.

- a. I worked it correctly, before I looked at the brief answer.
- b. I did not work it correctly at first, but as soon as I looked at the brief answer, I saw what I misunderstood and was able to correct it.
- c. I did not work it correctly at first, and the brief answer didn't help me enough, but after I read the answer with comments, I saw what I misunderstood and was able to correct it.
- d. I wasn't able to understand how to work the problem even after reading the answer with comments.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
a																													
b																													
c																													
d																													

The following patterns of answers indicate that you will probably need extra help from a knowledgeable person / tutor.

- (d) answers. 1 or 2 problems
- (c) or (d) answers: between 5 and 7 problems
- (b), (c), or (d) answers: between 7 and 10 problems

Remember that the answers to the homework questions provided during the course will not have comments like the ones provided for these answers. Arrange now to get knowledgeable help outside of class at least twice a week, every week, so that you don't get behind. Students who are struggling, and who fall behind, are seldom able to complete the course.

Missing more problems than indicated above is an indication that you are not yet ready for MATH 1342.

Problems:

1. Giselle and Ruth are discussing when they will wear raincoats.
 - Giselle says that she will wear a raincoat to school only if the weather report predicted more than a 50% chance of rain and, when she leaves in the morning, the sky is overcast.
 - Ruth says that she will wear a raincoat to school if either the weather report predicted more than a 50% chance of rain or if, when she leaves in the morning, the sky is overcast.

On Tuesday the weather report predicted a 40% chance of rain, but when the girls left for school, the sky was sunny.

On Wednesday the weather report predicted a 40% chance of rain, and when the girls left for school, the sky was overcast.

On Thursday, the weather report predicted a 60% chance of rain, and when the girls left for school, the sky was overcast.

On Friday, the weather report predicted a 60% chance of rain, and when the girls left for school, the sky was sunny.

Assuming that both girls acted as they claimed they would act,

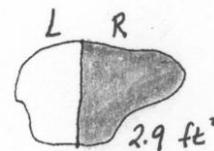
- a. What days did Giselle wear a raincoat?
 - b. What days did Ruth wear a raincoat?
2. Brent pays \$550 per month for rent and his monthly salary is \$1876.
 - (a) What proportion of his monthly salary is his rent? (This answer will be between 0.000 and 1.000)
 - (b) What percentage of his monthly salary is his rent? (This answer will be between 0.0% and 100.0%)

3. At Joliet High School, there are 325 seniors who entered Joliet schools in the fifth grade or lower, and 897 seniors who entered Joliet schools in the sixth grade or higher. What percentage of the seniors entered Joliet schools in the fifth grade or lower?

4. In a particular business college, the following table gives the numbers of men and women in various majors. What percentage of the women are accounting majors?

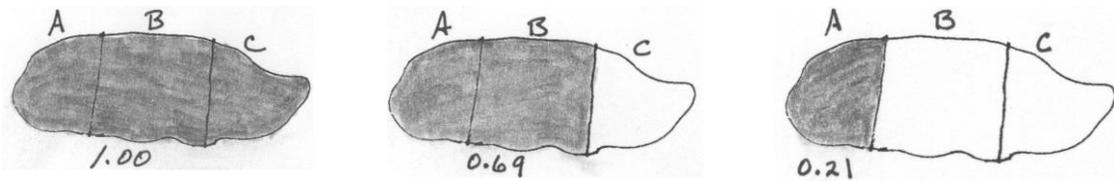
	Men	Women	total
Accounting	83	69	152
Administration	102	110	212
Finance	53	37	90
total	238	216	454

5. The figure at the right has total area of 5.3 square feet. The shaded area is 2.9 square feet. What is the area of the unshaded part, labeled L?



6. A figure is divided into three non-equal pieces by lines. The three pictures at the top of the next page are all of the same figure with the same division lines. Different areas are shaded and labeled on each.

Find the areas of the portions labeled B and C.



7. Round 17.39283 to the nearest thousandth.
8. Round 0.02397 to the nearest hundredth.
9. Use your calculator to find $\sqrt{19}$, correct to 3 decimal places.
10. Use your calculator to find 18^2
11. When a scientific calculator shows the answer for a computation is 7.23E-04, what number does that represent?
12. Consider the mathematical statement: $x < 3.24$
 - a. How would you read that statement in words?
 - b. Give four numbers that make that statement true.
 - c. Give either a number line or an interval that indicates all the numbers that make that statement true.
13. Consider the mathematical statement: $y \geq 5.8$
 - a. How would you read that statement in words?
 - b. Give four numbers that make that statement true.
 - c. Give either a number line or an interval that indicates all the numbers that make that statement true.
14. Solve for x : $4 + 3x = 17$
15. Solve for y : $8y - 9 = 23 + 27y$
16. Solve for r : $\frac{8}{5} = \frac{7}{r}$
17. Solve for m : $3.9 = \frac{34.2}{m}$
18. Solve for k : $9.7 = \frac{157.4}{\sqrt{k}}$

One way of writing the equation of a straight line is in the slope-intercept form: $y = mx + b$, where m is the slope and b is the y -intercept.

When we graph the equation of a line on a Cartesian coordinate system, usually we put y on the vertical axis and x on the horizontal axis.

19. For this equation of a line, identify the slope and the y -intercept. $y = 4x + 7$

20. For this equation of a line, identify the slope and the y-intercept. $y = 18x - 9.87$
21. For this equation of a line, identify the slope and the y-intercept. $y = -3 + 6x$
22. For this equation of a line, identify the slope and the y-intercept.
 $y = 0.00723 - 0.000452x$
23. Graph this line between $x = 4$ and $x = 30$. $y = 4.23 - 0.65x$

In the statistics course, the work is more about reasoning than about computation. Moreover, you'll use software for much of the computation. Nevertheless, to be successful, you must be able to correctly evaluate formulas using a scientific calculator.

When practicing evaluating new formulas with your calculator, it is a good idea to first use some easy numbers and do the problem "in your head" to make sure your calculator is giving you the right answer. This is the way to explore what order you need to enter the numbers. Only after you are completely clear about the order in which to enter the numbers should you start using it to calculate with numbers that are so "messy" you couldn't do it "in your head." In each of the problems below, be sure you can do the first part easily before you attempt the second part. The answers are provided right here rather than in the answer key, but some commentary is given in the full answer key. Read it if you're having difficulties.

24. $L = X + f \cdot d$

- Find L when $f = 3$, $d = 2$, $X = 11$
- Find L when $d = -8$, $f = 3$, $X = 11$
- Find L when $X = 8.79$, $d = 1.7$, $f = 3.23$

25. $w = \frac{X - m}{s / \sqrt{n}}$

- Find w when $X = 9$, $m = 6$, $s = 8$, $n = 16$
- Find w when $X = 0.49$, $m = 0.5$, $s = 0.063$, $n = 17$

26. $M = \frac{(R_1 - e_1)^2}{e_1} + \frac{(R_2 - e_2)^2}{e_2} + \frac{(R_3 - e_3)^2}{e_3}$

- Find M when $R_1 = 5$, $e_1 = 2$, $R_2 = 6$, $e_2 = 4$, $R_3 = 10$, $e_3 = 8$
- Find M when $R_1 = 8.1$, $e_1 = 7.8$, $R_2 = 6.3$, $e_2 = 5.1$, $R_3 = 15.7$, $e_3 = 14.1$

27. $R = \sqrt{\frac{m_1^2}{n_1} + \frac{m_2^2}{n_2}}$

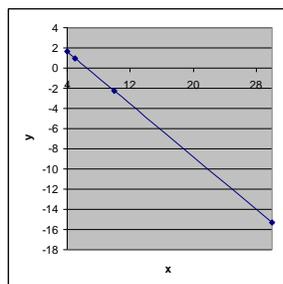
- Find R when $m_1 = 6$, $n_1 = 4$, $m_2 = 8$, $n_2 = 4$
- Find R when $m_1 = 6.21$, $n_1 = 32$, $m_2 = 8.73$, $n_2 = 49$

28. $r = \frac{m - t}{s}$

- Find m when $r = 2$, $s = 3$, $t = 4$.
- Find m when $r = 1.84$, $s = 3.12$, $t = 3.1$.

Brief answer key:

1. Giselle wore a raincoat only on Thursday. Ruth wore a raincoat on Wednesday, Thursday, and Friday.
2. a. 0.29318 b. 29.318%
3. 26.596%
4. 31.94%
5. 2.4 sq. ft.
6. B: 0.48; C: 0.31
7. 17.393.
8. 0.02
9. 4.359
10. 324
11. 0.000723
12. "x is less than 3.24." Many numbers make this true. Some numbers which make this true are 3.2, 1.8, and 0 and -9.3. In interval notation, this is $(-\infty, 3.24)$
13. "y is greater than or equal to 5.8." Many numbers make this true. Some numbers which make this true are 5.8, 6, 8.1, and 111.832. In interval notation, this is $[5.8, +\infty)$
14. $x = \frac{13}{3}$
15. $y = -\frac{32}{19}$
16. $r = \frac{35}{8}$
17. $m = 8.769$
18. $k = 263.3092$
19. slope 4, y-intercept 7
20. slope 18, y-intercept -9.87 .
21. slope 6, y-intercept -3 .
22. slope -0.000452 , y-intercept 0.00723.
- 23.



24. a. 17 b. -13 c. 14.281
25. a. 1.5 b. -0.6545
26. a. 6 b. 0.47548
27. a. 5 b. 1.66147
28. a. 10 b. 8.8408

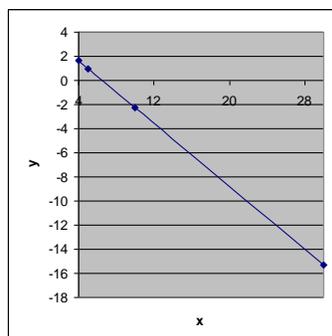
Answer key with comments:

- (Skill: Reading Comprehension) Giselle wore a raincoat only on Thursday. Ruth wore a raincoat on Wednesday, Thursday, and Friday.
This problem requires that you understand the difference in meaning between “and” and “or” and that you know to look for which of those words is used in each description.
- (Skill: Calculation proportions and percentages)
a. $550/1876 = 0.29318$ b. $0.29318 = 29.318\%$
You must know the difference between proportion and percent and how to easily convert between them.
- (Skill: Setting up ratios and calculating percentages)
 $325/(325+897) = 0.26596 = 26.596\%$
Notice that, to find the total number of seniors, you must add the two numbers given. Sometimes students assume that the two numbers given in the problem are the appropriate numbers to plug into a formula, and that is often not the case.
- (Skill: Setting up ratios and calculating percentages) $69/216 = 0.3194 = 31.94\%$
The crucial point here is that you must be able to understand, by reading, the difference between the two questions “What percentage of the women major in accounting?” and “What percent of the accounting majors are women?” The difference in these two questions tells us the difference in the denominators we need to compute the answers. For the first question, the denominator is the total number of women. For the second question, the denominator is the total number of accounting majors. The question asked in the problem is “What percentage of the women major in accounting?” for which the answer is approximately 32% as shown in the first line of this solution. If this question were asked “What percentage of the accounting majors are women?” the answer would be $69/152 = 45.39\%$.
- (Skill: Logical reasoning with geometry)
2.4 sq. ft. Area of the un-shaded part is $5.3 - 2.9 = 2.4$
- (Skill: Logical reasoning with geometry)
B: 0.48; C: 0.31. Area of B = $0.69 - 0.21 = 0.48$. Area of C = $1.00 - 0.69 = 0.31$
- (Skill: Place value and rounding) 17.393. When you round, if the part you are leaving off is half or more, the previous digit is increased by 1.
- (Skill: Place value and rounding) 0.02. Notice that the part you are leaving off is less than half.
- (Skill: Understanding and calculating the square root of a number) 4.359
- (Skill: Understanding and calculating the square of a number) 324. Notice the difference between taking the square root of a number and squaring a number. It is very important to be clear about which one you’re doing.
- (Skill: Numbers in Scientific Notation and reading calculator output) 0.000723.
This number is in scientific notation. It means $7.23E-04 = 7.23 \times 10^{-4} = 0.000723$
- (Skill: Understanding and translating math inequality notation) “x is less than 3.24.”
Many numbers make this true. Some numbers which make this true are 3.2, 1.8, and 0 and -9.3. In interval notation, this is $(-\infty, 3.24)$
- (Skill: Understanding and translating math inequality notation) “y is greater than or equal to 5.8.” Many numbers make this true. Some numbers which make this true are 5.8, 6, 8.1, and 111.832. In interval notation, this is $[5.8, +\infty)$

14. (*Skill: Solving linear equations*) $x = \frac{13}{3}$. It is also acceptable to write this answer as a mixed number, $y = 4\frac{1}{3}$, or as a decimal, $y = 4.333$. When you write answers in decimal form, often the accurate answer has an infinite decimal expansion. You do not have to list as many decimal places as your calculator gives you. Your instructor will give you more specific guidelines for various types of problems. When no guidelines are given and it seems reasonable, you should keep about three decimal places.
15. (*Skill: Solving linear equations*) $y = -\frac{32}{19}$. Again, it is acceptable to write this as an improper fraction as is given here, or as an equivalent mixed number, $y = -1\frac{13}{19}$, or as an equivalent decimal, $y = -1.684$
16. (*Skill: Solving proportion equations*) $r = \frac{35}{8}$. Again, it is acceptable to write this as an improper fraction, as given here, or an equivalent mixed number or an equivalent decimal number.
17. (*Skill: Solving proportion equations*) $m = 8.769$. In this problem, you must recognize how to solve a proportion equation when one of the sides is not written as a fraction. An easy way is to first turn it into a fraction, as $\frac{3.9}{1} = \frac{34.2}{m}$ and then follow the same steps as in the previous problem. As part of the solution, you found $m = \frac{34.2}{3.9}$ but that is not an acceptable final answer because fractions in final answers must have whole numbers for both the numerator and denominator. So you must divide these for an acceptable final answer.
18. (*Skill: Solving proportion equations involving a square root*) $k = 263.3092$. Do this problem in a similar manner to the previous problem, except that, after you find $\sqrt{k} = \frac{157.4}{9.7}$, square both sides.
19. (*Skill: Interpreting linear equations*) slope 4, y-intercept 7
20. (*Skill: Interpreting linear equations*) slope 18, y-intercept -9.87 . To write this in the form $y = mx + b$, we have $y = 18x + (-9.87)$, so the subtraction turns into a negative number for the y-intercept.
21. (*Skill: Interpreting linear equations*) slope 6, y-intercept -3 . To write this in the form $y = mx + b$, we have to reverse the order of the two terms. In fact, we wouldn't rewrite it. Instead we make a point to think of the slope coefficient as the number that is multiplied by the x . It doesn't matter whether that term comes first or second.
22. (*Skill: Interpreting linear equations*) slope -0.000452 , y-intercept 0.00723 . Notice that, if we had computed these coefficients, we should not be content to round all numbers to three decimal places, since we'd lose too much information. If we have very small numbers, like these, we usually keep at least three decimal places past all leading zeros.

23. (Skill: Graphing linear equations over a specific interval) You can choose any x-values in the appropriate interval to plug in. No matter what you choose, you should get the same line on a graph.

x	y
4	1.63
5	0.98
10	-2.27
30	-15.27



24. (Skill: Using formulas, order of operations) a. 17 b. -13 c. 14.281 There are different ways to enter these numbers and operations and obtain a correct answer, depending on the type of calculator, whether you use parentheses or not, and whether you use negative numbers or just change to subtractions, as appropriate. It is crucial that you understand, from previous math courses, the appropriate order of operations, that is, that the multiplication here must be done before the addition. Maybe your calculator handles that and maybe it doesn't, depending on how you enter the numbers. Be alert and think about the results.
25. (Skill: Using formulas, order of operations) a. 1.5 b. -0.6545 Although it is best to be able to enter all the numbers in the calculator and have it compute one final result, sometimes that is difficult. Here you'll need some parentheses in order to do that. If you can't make that work, then do some parts of it separately, write down the results, and then use your calculator with your written results to find the final answer. (I recommend about five decimal places for intermediate results, in order to have a reasonable chance of getting final results accurate to about three decimal places.)
26. (Skill: Using formulas, order of operations) a. 6 b. 0.47548 Most students will want to do the three parts of this separately, write the results of each, and then add them together with a calculator at the end.
27. (Skill: Using formulas, order of operations) a. 5 b. 1.66147 Notice that it is NOT CORRECT to take the square root of each part separately and add those. The formula says that you must add first and then take the square root. Sometimes we can change the order of operations because the two different ways are algebraically equivalent. But not here.
28. (Skill: Using formulas, solving proportion equations) a. 10 b. 8.8408 Here, you will need to solve a proportion equation to obtain the answer. For part a, we have

$$r = \frac{m-t}{s} \quad \text{becomes} \quad \begin{aligned} 2 &= \frac{m-4}{3} \\ \frac{2}{1} &= \frac{m-4}{3} \\ 6 &= m-4 \\ 6+4 &= m-4+4 \\ 10 &= m \end{aligned}$$

Alternatively, you could just solve the equation first for m in terms of the other variables, and then plug in the values of the other variables.

$$r = \frac{m-t}{s}$$

$$\frac{r}{1} = \frac{m-t}{s}$$

$$r \cdot s = m-t$$

$$r \cdot s + t = m-t+t$$

$$r \cdot s + t = m$$

$$m = r \cdot s + t$$

Then, we have

$$m = r \cdot s + t$$

$$m = 2 \cdot 3 + 4$$

$$m = 6 + 4$$

$$m = 10$$

It is acceptable for students in this course to always work these problems the first way illustrated here (plugging in numbers first and then solving) rather than the second way, which is more abstract.