Math 71 Exam #2 Review Sheet – Fall 2019

Please Note: The review sheet is designed for you to have a guide as to what to study. The problems on the exam are not limited to the type of problems on this sheet. Any type of problem from the assigned homework problems are possible exam questions. Please attempt other practice problems other than those presented on this sheet in order to be completely prepared for the exam.

1. Solve the following inequalities. Write the solution set in interval notation.

a. $5 < 1 - 6m < 12$

b. $-7 \le 3x - 4 \le 8$

c. $2 < 6 + \frac{3}{4}x \le 12$

d. $-12 \le \frac{3}{7}x + 2 < -4$

e. $6 - 5x > 1 - 3x$ and $4x - 3 > x - 9$

f. $3 \le 4x - 3 < 19$

g. $3x + 2 \le 5$ or $5x - 7 \ge 8$

h. $4x + 3 < -1$ or $2x - 3 \ge -11$

i. $5(x - 2) > 15$ and $\frac{x - 6}{4} \le -2$

j. $|2x - 5| > 3$

k. $|2(x - 1) + 4| \le 8$

l. $|3x - 5| > -3$

m. $|6x + 2| \le -5$

2. Solve the following equations.

a. $|4x - 3| = 9$

b. $3|2x - 1| = 21$

c. $|4x - 9| = |2x + 1|$

d. $|x + 1| + 5 = 3$

3. Graph the following linear inequalities.

a. $2x - 3y \ge 6$

b. $3x + 5y \le 10$

c. $2x - y \le 4$

d. $3x + 2y > -6$

4. Perform the indicated operations.

a. $\left(-9xy^2 - xy + 6x^2y\right) + \left(-5x^2y - xy + 4xy^2\right) + \left(12x^2y - 3xy^2 + 6xy\right)$

b. $\left(8x^2 - 4xy + y^2\right) - \left(2x^2 + 3xy - 2y^2\right)$

c. $\left(y + 8x\right)\left(2y - 7x\right)$

d. $\left(x + 1\right)\left(x - 1\right)\left(x^2 + 1\right)$

e. $\left(x^2 - 2x + 1\right)\left(x^2 + x + 2\right)$

f. $\left(x^3 - 2x^2 + 2x - 5\right) \div \left(x + 1\right)$

g. $\left(3x^4 + 2x^3 - 11x^2 - 2x + 5\right) \div \left(x^2 - 2\right)$

5. Factor completely.

a. $2w^3 - 2w^2 + 3w - 3$

b. $15x^2 - 14x - 8$

c. $-3x^3 + 27x$

d. $9x^2 - 12xy + 4y^2$

e. $x^2 - 12x - 28$

f. $y^3 + 5y^2 - 4y - 20$

g. $24x^2 - 46x + 10$

h. $x^8 - y^8$

i. $27x^3 - 64y^3$

j. $m^6 + 8m^3 - 20$

k. $10x^2 + 19x + 6$

l. $6x^2 - 7xy - 5y^2$

m. $\left(x - 6\right)^2 - y^2$

n. $64x^2 - 16y^2$

o. $x^2 - 14x + 49$

p. $9x^2 + 48xy + 64y^2$

q. $2x^3y - 32xy$

r. $x^2 - 12x + 36 - y^2$

6. Solve the following equations.

a. $9x^2 = 30x - 25$

b. $\left(x - 3\right)\left(x + 2\right) = 14$

c. $x^2 - 49 = 0$

d. $\left(x + 1\right)^2 - 5\left(x + 2\right) = 3x + 7$

e. $x^3 + 2x^2 = 16x + 32$

f. $3x^3 - 9x^2 - 30x = 0$

7. The foot of an extension ladder is 10 ft from a wall. The ladder is 2 ft longer then the height that it reaches on the wall. How far up the wall does the ladder reach?

8. A rectangular garden is 60 ft by 80 ft. Part of the garden is removed in order to install a walkway of uniform width around it. The area of the new lawn is one-half the area of the old garden. How wide is the walkway?

9. Each side of a square is lengthened by 2 inches. The area of this new, larger square is 36 square inches. Find the length of a side of the original square.

10. A painting measuring 10 inches by 16 inches is surrounded by a frame of uniform width. If the combined area of the painting and frame is 280 square inches, determine the width of the frame.

11. Simplify the following rational expressions.

a. $\dfrac{3x-6}{5x} \cdot \dfrac{x^3}{5x-10}$

b. $\dfrac{x^2-16}{x^2-10x+25} \div \dfrac{3x-12}{x^2-3x-10}$

c. $\dfrac{4}{x+1} + \dfrac{x+2}{x^2-1} + \dfrac{3}{x-1}$

d. $\dfrac{a-3}{a^2-16} - \dfrac{3a-2}{a^2+2a-24}$

e. $\dfrac{\dfrac{4}{x^2-1} - \dfrac{3}{x+1}}{\dfrac{5}{x^2-1} - \dfrac{2}{x-1}}$

f. $\dfrac{x^{-1} + y^{-1}}{\dfrac{x^2 - y^2}{xy}}$

12. Solve the following equations.

a. $\frac{x-2}{2x}+1=\frac{x+1}{x}$

b. $\frac{x+2}{x+10}=\frac{x-3}{x+4}$

c. $\frac{8}{x^2-9}+\frac{4}{x+3}=\frac{2}{x-3}$

d. $\frac{1}{x-2}+\frac{1}{x+2}=\frac{4}{x^2-4}$

e. $\frac{2x-1}{x^2+2x-8}+\frac{2}{x+4}=\frac{1}{x-2}$

13. The speed of the current in Willow Creek is 3 mph. Bill's kayak can travel 4 mi upstream in the same time it takes to travel 10 mi downstream. What is the speed of Bill's kayak in still water?

14. You can travel 40 miles on motorcycle in the same time that it takes to travel 15 miles on bicycle. If your motorcycle's rate is 20 miles per hour faster than your bicycle's, find the average rate for each.

15. In still water, a boat averages 8 miles per hour. It takes the same amount of time to travel 15 miles downstream, with the current, as 9 miles upstream, against the current. What is the rate of the water's current?

16. Two runners, one averaging 8 miles per hour and the other 6 miles per hour, start at the same place and run along the same trail. The slower runner arrived at the end of the trail a half hour after the faster runner. How far did each person run?

17. A pool can be filled by one pipe in 3 hours and by a second pipe in 6 hours. How long will it take using both pipes to fill the pool?

18. Working together, Lou and Bud can paint a room in 6 hours. Working alone, it takes Lou 5 hours longer than Bud to do the job. How long would it take Bud to paint the room alone?

19. During the first part of a trip, Bill traveled 120 miles at a certain speed. Bill then drove another 100 miles at a speed that was 10 miles per hour slower. If Bill's total trip time was 4 hours, what was his speed on each part of the trip?

20. The product of two consecutive integers is 4 less than 4 times their sum. Find the integers.

21. The width of a toolbox is 3 feet less than its length. The toolbox is 2 feet high and the volume of the tool box is 80 cubic feet. What are the length and the width of the toolbox?

22. The length of a VHS videocassette shell is 3 inches more than its width. The area of the rectangular top side of the shell is 28 square inches. Find the length and the width of the videocassette shell.

23. Find the domains of the following functions.

a. $f(x)=\dfrac{3}{2x-5}$

b. $f(x)=\dfrac{2x+1}{x^2-5x+4}$

c. $f(x)=\dfrac{7x}{5-x}$