

Math 71 Exam #3 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. Perform the indicated operations.

a. $(x^3 - 2x^2 + 2x - 5) \div (x + 1)$

b. $(3x^4 + 2x^3 - 11x^2 - 2x + 5) \div (x^2 - 2)$

2. Simplify the following rational expressions.

a. $\frac{\frac{4}{x^2-1} - \frac{3}{x+1}}{\frac{x^2-1}{5} - \frac{2}{x-1}}$

b. $\frac{\frac{1}{x} + \frac{1}{y}}{\frac{1}{x^2} - \frac{1}{y^2}}$

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

4. 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?
5. 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.
6. 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?
7. 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?
8. 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?
9. Simplify each expression.

a. $\sqrt{36}$

b. $-\sqrt{49}$

c. $\sqrt{-25}$

d. $\sqrt[3]{27}$

e. $\sqrt[3]{-64}$

f. $\sqrt{x^2}$

g. $\sqrt[3]{x^3}$

h. $\sqrt{(x-3)^2}$

i. $\sqrt{x^2 + 8x + 16}$

j. $\sqrt[4]{x^4}$

k. $\sqrt[4]{16}$

l. $\sqrt[4]{-16}$

10. Simplify the following expressions. Assume that all variables represent nonnegative real numbers.

a. $81^{\frac{1}{2}}$

b. $27^{\frac{2}{3}}$

c. $16^{\frac{3}{4}}$

d. $x^{\frac{2}{5}} \cdot x^{\frac{3}{7}}$

e. $\frac{x^{\frac{4}{5}}}{x^{\frac{2}{9}}}$

f. $\left(x^{\frac{4}{7}}\right)^{\frac{5}{8}}$

g. $\sqrt{x^2}$

h. $\sqrt[3]{x^3}$

i. $\sqrt[3]{x^9}$

j. $\sqrt[4]{x^{12}y^8}$

k. $\sqrt[3]{125x^{21}y^{33}}$

l. $\sqrt[8]{x^2}$

$$m. \sqrt[4]{x^2 y^6}$$

$$n. \sqrt{56}$$

$$o. \sqrt{72x^5 y^8 z^2}$$

$$p. \sqrt[3]{48x^{16} y^{29}}$$

11. Perform the indicated operations.

$$a. 5\sqrt{12} + 16\sqrt{27}$$

$$b. \sqrt{5a} + 2\sqrt{45a^3}$$

$$c. \sqrt{10} \cdot \sqrt{5}$$

$$d. \sqrt{5a^7} \cdot \sqrt{15a^3}$$

$$e. \frac{\sqrt{40xy^3}}{\sqrt{8x}}$$

$$f. (2\sqrt{5} - \sqrt{7})(3\sqrt{5} + 4\sqrt{7})$$

$$g. \sqrt{18} - \sqrt{50} + \sqrt{12} - \sqrt{75}$$

12. Rationalize the denominator.

$$a. \frac{4\sqrt{5}}{3\sqrt{2}}$$

$$b. \frac{12}{\sqrt{72}}$$

$$c. \frac{\sqrt{12}}{\sqrt{3}-1}$$

$$d. \frac{5}{\sqrt[3]{9}}$$

$$e. \frac{7}{\sqrt[5]{8}}$$

$$f. \frac{3-\sqrt{2}}{5+\sqrt{6}}$$

13. Solve for x .

$$a. \sqrt{m} - 5 = 0$$

$$b. \sqrt{5m+4} = 3\sqrt{m}$$

$$c. \sqrt{4y+1} = y-1$$

$$d. \sqrt[3]{x+5} = 2$$

$$e. \sqrt{5t+3} = 2$$

$$f. x = 2\sqrt{x-1}$$

$$g. \sqrt{3-x+x^2} = x-2$$

$$h. 2 + \sqrt{12-2x} = x$$

14. Evaluate.

$$a. (9-3i) - (2+4i)$$

$$b. (2-i)(3+4i)$$

c. $\sqrt{-16} \cdot \sqrt{-4}$

d. $\frac{4}{2+3i}$

15. Solve the following equations by using the square root property.

a. $(y+3)^2 = 64$

b. $(4x+3)^2 = 24$

16. Solve the following equations by completing the square and by using the quadratic formula. If your solution contains complex solutions, write in the form $a+bi$.

a. $x^2 + 6x = 7$

b. $4x^2 + 8x + 3 = 0$

c. $x^4 - 5x^2 + 4 = 0$

d. $x^2 = -12x + 13$

e. $x^2 - 4x + 4 = 0$

f. $2x^2 + 12x = -5$

g. $6x^2 + 6x = 0$

h. $2x^2 + x + 5 = 0$

i. $(x+3)(x+2) = 15$

j. $x^2 - 2x + 2 = 0$

k. $6y^2 + 2y + 1 = 0$

17. Graph each of the following quadratic functions. Determine the vertex, axis of symmetry, and intercepts, if they exist.

a. $f(x) = (x-3)^2 - 4$

b. $f(x) = x^2 - 6x + 9$

c. $f(x) = 2x^2 - x + 2$

d. $f(x) = 2x^2 + 5x + 3$

18. Solve the following inequalities.

a. $\frac{(x-3)(x-1)}{x+4} \geq 0$

d. $(x-3)^2(x+1) \leq 0$

b. $x^2 + 4x < 12$

e. $\frac{x+1}{x-3} \geq 0$

c. $(x-4)(x+2)(x-1) < 0$

19. Given the following functions are one-to-one. Find $f^{-1}(x)$.

a. $f(x) = x^5 + 2$

b. $f(x) = 4x - 3$

$$c. f(x) = \frac{2}{x-3}$$

$$d. f(x) = \frac{1}{x}$$

20. Given the following functions:

$$f(x) = x^2 - 3x + 2, g(x) = -4x + 5, h(x) = \frac{2x-3}{4x+5} \text{ and } k(x) = \sqrt{x+3}$$

Find:

$$a. (f \circ g)(2)$$

$$b. (g \circ f)(x)$$

$$c. (h \circ k)(6)$$

21. Graph the following functions.

$$a. f(x) = 3^x$$

$$b. f(x) = \left(\frac{1}{2}\right)^x$$

$$c. f(x) = \log_4 x$$

$$d. f(x) = 2^{x-1} + 4$$

$$e. f(x) = \log_2(x+3) - 4$$

22. Evaluate the following.

$$a. \log_5 25$$

$$b. \log_2 \frac{1}{8}$$

$$c. \log_7 \sqrt{7}$$

$$d. \log_5 5$$

$$e. \log_6 1$$

$$f. \log_4 4^6$$

$$g. 8^{\log_8 19}$$

$$h. \log_2 64$$

$$i. \log_{49} 7$$