

EXAM 4 REVIEW – MATH 002

The following is a review of the concepts you should know for this exam. This review is a sample and is not intended to mirror the test questions. In addition, any problems similar to those discussed in class or in assigned homework sets may be assessed on the exam.

1. Simplify the following:

a) $\sqrt[5]{64x^3y^{12}z^6}$ b) $\sqrt{72x^3}$ c) $\left(\frac{9}{16}\right)^{-3/2}$

d) $\left(\frac{36a^{5/3}}{b^{2/5}c^{-1/3}}\right)^{1/2}$ e) $\sqrt{(25ab)^2}$ f) $x^{1/6} \cdot x^{-2/3}$

g) $\frac{a^{1/2}}{a^{-3/4}}$

2. Perform the indicated operation.

a) $\sqrt{48x^2yz^3} + x\sqrt{3yz^3}$ b) $\sqrt[3]{54} - \sqrt[3]{128}$

c) $2\sqrt{5}(3\sqrt{20} - \sqrt{10})$ d) $(5 - \sqrt{x})^2$

3. Rationalize the denominator.

a) $\sqrt{\frac{12a^3}{7b^5}}$ b) $\frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}$

4. Solve for x .

a) $2\sqrt{x+1} = x - 7$ b) $\sqrt[3]{x+5} + 3 = 1$

c) $(x+1)^{1/2} = 3$ d) $(x-2)^{2/3} = 4$

5. Given $f(x) = \sqrt[3]{x} + 1$ and $g(x) = \sqrt{x-3}$

a) find $f(-8); g(7)$ b) the domain of $g(x)$ c) sketch the graph of each

6. The legs of a right triangle are 6 feet and $8\sqrt{3}$ feet. Find the length of the hypotenuse.

7. Perform the indicated operation and simplify. Write the result in the form $a + bi$

a) $\sqrt{-54}$ b) $(4 + 3i) - (6 - 5i)$ c) $9i(2 - 4i)$

d) $(3 - 8i)^2$ e) $\frac{2 - 6i}{3 + i}$

8. Solve by completing the square.

a) $x^2 + 6x + 4 = 0$ b) $3x^2 - 2x + 1 = 0$

9. Solve using an appropriate technique.

a) $(x+4)^2 = 48$ b) $x^2 - 5x - 50 = 0$ c) $4x^2 - 2x = -5$

d) $2x^3 - 54 = 0$ e) $\frac{3}{x} + \frac{2}{x-1} = 6$ f) $3x^2 - 7x = 2$

10. Determine what type and how many solutions there are for each of the following. Use the value of the discriminant or an explanation of the graph to justify your answer.
- a) $9x^2 - 12x + 4 = 0$ b) $x^2 + 5x + 8 = 0$ c) $2x^2 = 3 - 7x$
11. A stone is thrown upward from a bridge. The stone's height in feet, $s(t)$, above the water t seconds after the stone is thrown is a function given by the equation $s(t) = -16t^2 + 32t + 256$. Find the time it takes the stone to hit the water. Round the answer to two decimal places.
12. The diagonal of a rectangle measures 20 inches. If the length is 4 inches more than the width, find the dimensions of the rectangle.
13. Find the distance between the points $(3, -5)$ and $(-1, 3)$. Give the answer in simplified radical form and as a decimal rounded to the nearest hundredth.
14. Simplify the following expression $\sqrt[3]{x^2}$
- a) $x^{3/2}$ b) $x\sqrt{x}$
- c) $x\sqrt[3]{x}$ d) $x^{2/3}$
15. $\sqrt[4]{16x^4}$
- a) $4x^2$ b) $16x$
- c) $4x$ d) $2x$
16. $16^{3/2}$
- a) 64 b) $\sqrt[3]{16^2}$ c) 8^3 d) 24
17. $a^{-2/3}$
- a) $\sqrt{a^3}$ b) $\frac{1}{\sqrt[3]{a^2}}$ c) $\frac{1}{a^{3/2}}$ d) $-\sqrt[3]{a^2}$
18. If the discriminant $(b^2 - 4ac)$ of the quadratic formula is less than zero, the nature of the solution(s) is(are):
- a) Two unique real solutions b) One repeated real solution
- c) Two complex solutions d) no solution

19. To simplify the expression $\frac{2}{2+3i}$, multiply the numerator and denominator by:

- a) $-2+3i$ b) $2+3i$ c) $-2-3i$ d) $2-3i$

20. Perform the operation and write the expression in the form $a+bi$: $(-9+2i)-(3+6i)$

- a) $-6+8i$ b) $-6-8i$ c) $-12-4i$ d) $-12+8i$

Answers

1. a) $2y^2z\sqrt[5]{2x^3y^2z}$ b) $6x\sqrt{2x}$ c) $\frac{64}{27}$ d) $\frac{6a^{5/6}c^{1/6}}{b^{1/5}}$ e) $25ab$ f) $\frac{1}{x^{1/2}}$ g) $a^{5/4}$

2. a) $5xz\sqrt{3yz}$ b) $-\sqrt[3]{2}$ c) $60-10\sqrt{2}$ d) $25-10\sqrt{x}+x$

3. a) $\frac{2a}{7b^3}\sqrt{21ab}$ b) $14-\sqrt{15}$

4. a) $x=15$, 3 is extraneous b) $x=-13$ c) $x=8$ d) $x=10$

5. a) $f(-18)=-1, g(7)=2$ b) $[3, \infty)$ c) see page 530: 91, 93

6. $2\sqrt{57}$

7. a) $3i\sqrt{6}$ b) $-2+8i$ c) $36+18i$ d) $-55-48i$ e) $0-2i$

8. a) $-3\pm\sqrt{5}$ b) $\frac{1\pm i\sqrt{2}}{3}$

9. a) $-4\pm 4\sqrt{3}$ b) $-5, 10$ c) $\frac{1\pm i\sqrt{19}}{4}$ d) $3, \frac{-3\pm 3i\sqrt{3}}{2}$ e) $\frac{1}{3}, \frac{3}{2}$ f) $\frac{7\pm\sqrt{73}}{6}$

10. a) one repeated rational solution b) two complex solutions c) two irrational solutions

11. 5.12 sec.

12. 12 inches by 16 inches

13. $4\sqrt{5}$ or 8.94

14. d

15. d

16. a

17. b

18. c

19. d

20. c