

Module 1 Practice Test SOLUTIONS

Student: _____
Date: _____

Instructor: Mary Robertson
Course: ~~Math~~ College Algebra

Assignment: Test #1, Module 1 (1.1-1.8)

1. Determine whether the given equation is linear or nonlinear.

$$\sqrt{2x} - 4 = 0$$

The equation is (1) _____

- (1) linear.
 nonlinear.

x is to the 1st power

2. Solve the equation.

$$12 \left[\frac{1}{3}x - \frac{1}{4}(x-4) = 4x \right]$$

LCD = 12

$$4x - 3(x-4) = 48x$$

$$4x - 3x + 12 = 48x$$

$$x + 12 = 48x$$

$$12 = 47x$$

$$\boxed{\frac{12}{47} = x}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. $x = \frac{12}{47}$. (Type an integer or a simplified fraction.)
 B. The solution is all real numbers.
 C. There is no solution.

3. Solve.

LCD = (z+1)(z+3)

$$(z+3)(1) + (z+1)(3) = 2$$

$$z+3 + 3z+3 = 2$$

$$4z+6 = 2$$

$$4z = -4$$

$$z = -1$$

$\rightarrow \boxed{\emptyset}$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. $z =$ _____
(Type an integer or a fraction. Use a comma to separate answers as needed.)
 B. The solution is all real numbers.
 C. There is no solution. *When $z = -1$, the denominator = 0.*

4. The perimeter of a rectangular garden is 108 meters. The length is 6 meters longer than twice the width. Find the dimensions of the garden.

$$2(2w+6) + 2w = 108$$

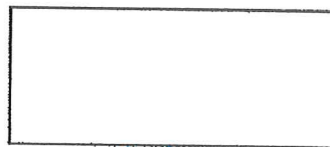
$$4w + 12 + 2w = 108$$

$$6w + 12 = 108$$

$$6w = 96$$

$$w = 16$$

$$L = 38$$



$$w = 16$$

$$2w + 6$$

$$2(16) + 6$$

$$L = 38$$

What is the width?

16 m

What is the length?

38 m

5. A freight train leaves the train station 1 hour before a passenger train. The two trains are traveling in the same direction on parallel tracks. If the rate of the passenger train is 5 mph faster than the freight train, how fast is each train traveling if the passenger train passes the freight train in 12 hours?

How fast is the freight train traveling?

60 mph
(Type an integer or a decimal.)

How fast is the passenger train traveling?

65 mph
(Type an integer or a decimal.)

$$r \cdot t = d$$

F-train	r	13	13r
P-train	r+5	12	12r+60

$$13r = 12r + 60$$

$$r = \begin{matrix} 60 \text{ (F-train)} \\ 65 \text{ (P-train)} \end{matrix}$$

6. A grain barge travels on a river from point A to point B loading and unloading grain. The barge travels at a rate of 3 mph relative to the water. The river flows downstream at a rate of 1 mph. If the trip upstream takes 2 hours longer than the trip downstream, how far is it from point A to point B?

The distance from point A to point B is 8 miles.

$$r \cdot t = d$$

upstream	2	t+2	2t+4
downstream	4	t	4t

$$4t = 2t + 4$$

$$2t = 4$$

$$t = 2$$

$2 \cdot 4 = 8 \text{ mi}$

7. Find the desired sum. Write the answer in the form $a + bi$.

$$(6 - 2i) + (9 + 3i)$$

$(6 - 2i) + (9 + 3i) = \underline{15 + i}$
(Simplify your answer. Type your answer in the form $a + bi$.)

8. Perform the desired operations.

$$(-4 - 3i)(7 - 8i)$$

$(-4 - 3i)(7 - 8i) = \underline{-52 + 11i}$
(Simplify your answer. Type your answer in the form $a + bi$.)

$$-28 + 32i - 21i + 24i^2$$

$$-28 + 11i - 24$$

9. Write the given quotient in the form $a + bi$.

$$\frac{(3 - 5i)(7 - 4i)}{(7 + 4i)(7 - 4i)} = \frac{21 - 12i - 35i + 20i^2}{49 - 16i^2} = \frac{21 - 47i - 20}{49 + 16} = \frac{1 - 47i}{65}$$

$$\frac{3 - 5i}{7 + 4i} = \frac{1}{65} - \frac{47i}{65}$$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

$$= \frac{1}{65} - \frac{47i}{65}$$

10. Solve using the square root property.

$$5x^2 = 35$$

$$5x^2 = 35$$

$$x^2 = 7$$

$$x = \pm\sqrt{7}$$

The solution is $x = \underline{\pm\sqrt{7}}$.

(Simplify your answer. Type an exact answer, using radicals as needed. Express complex numbers in terms of i . Use a comma to separate answers as needed.)

$$(x^2 - 6x + 9) = 0 + 8 + 9$$

$$(x-3)^2 = 17$$

$$x-3 = \pm\sqrt{17}$$

$$x = 3 \pm \sqrt{17}$$

11. Solve the quadratic equation by completing the square.

$$x^2 - 6x - 8 = 0$$

$$x = 3 \pm \sqrt{17}$$

(Type an exact answer, using radicals as needed. Express complex numbers in terms of i . Use a comma to separate answers as needed.)

12. Solve the equation using the quadratic formula.

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

$$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(-4)}}{2(1)} = \frac{-2 \pm \sqrt{20}}{2}$$

$$x = -1 \pm \sqrt{5}$$

$$x = \frac{-2 \pm 2\sqrt{5}}{2} = -1 \pm \sqrt{5}$$

(Type an exact answer, using radicals as needed. Express complex numbers in terms of i . Use a comma to separate answers as needed.)

13. Benjamin threw a rock straight up from a cliff that was 160 ft above the water. If the height of the rock h , in feet, after t seconds is given by the equation $h = -16t^2 + 108t + 160$, how long will it take for the rock to hit the water?

The rock will hit the water in 8 seconds. $(-16t^2 + 108t + 160 = 0) \div -4 \rightarrow$

14. Find all solutions.

$$x^3 + 16x = 0$$

$$x(x^2 + 16) = 0$$

$$x = 0 \quad x^2 + 16 = 0$$

$$x^2 = -16$$

$$x = \pm 4i$$

$$4t^2 - 27t - 40 = 0$$

$$t = \frac{27 \pm \sqrt{27^2 - 4(4)(-40)}}{2(4)}$$

$$t = 8$$

The solution set is $\{0, \pm 4i\}$.

(Simplify your answer. Type an exact answer, using radicals as needed. Express complex numbers in terms of i . Use a comma to separate answers as needed. Type each solution only once.)

15. Which of the following equations is not a disguised quadratic equation?

Choose the incorrect equation below.

A. $3x^{-2} - 5x^{-1} - 2 = 0 \rightarrow (n = x^{-1}) 3n^2 - 5n - 2 = 0$

B. $2x^4 - 11x^2 + 12 = 0 (n = x^2) 2n^2 - 11n + 12 = 0$

C. $x^5 - x^3 - 6 = 0$ *Cannot be rewritten so it is not a disguised quadratic equation.*

D. $x^{2/3} - 9x^{1/3} + 8 = 0 (n = x^{1/3}) n^2 - 9n + 8 = 0$

16. Solve the equation after making an appropriate substitution.

$$x^4 - 30x^2 + 125 = 0 \quad (n = x^2)$$

$$n^2 - 30n + 125 = 0$$

$$(n - 25)(n - 5) = 0$$

$$n = 25, n = 5$$

$$x^2 = 25 \quad x^2 = 5$$

$$x = \pm 5, x = \pm \sqrt{5}$$

Determine the appropriate substitution using the new variable u : $u = x^2$.

Write the new quadratic equation using the variable u : $u^2 - 30u + 125 = 0$
(Type an equation. Type your answer in standard form.)

Solve the new quadratic equation for the variable u . $u = 25, 5$
(Simplify your answer. Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

The solution set to the original equation is $\{\pm 5, \pm \sqrt{5}\}$.
(Simplify your answer. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)

17. Solve the equation.

$$\sqrt{6x+3} = 3$$

$$(\sqrt{6x+3})^2 = (3)^2$$

$$6x+3 = 9$$

$$6x = 6$$

$$x = 1$$

check:

$$\sqrt{6 \cdot 1 + 3} = 3$$

$$\sqrt{9} = 3$$

$$3 = 3$$

The solution set is $\{1\}$.

(Simplify your answer. Use a comma to separate answers as needed.)

18. Solve the radical equation.

$$\sqrt{9-4x} = x+9$$

$$(\sqrt{9-4x})^2 = (x+9)^2$$

$$9-4x = x^2+18x+81$$

$$0 = x^2+22x+72$$

$$0 = (x+18)(x+4)$$

$$0 = x+18$$

$$x+4=0$$

$$x = -18$$

$$x = -4$$

check answers

The solution set is $\{-4\}$.

19. Solve the radical equation.

$$\sqrt{7y+1} - \sqrt{y+16} = 3$$

$$(\sqrt{7y+1})^2 = (3 + \sqrt{y+16})^2$$

$$7y+1 = 9 + 6\sqrt{y+16} + y + 16$$

$$7y+1 = 25 + 6\sqrt{y+16} + y$$

$$6y-24 = 6\sqrt{y+16}$$

$$(y-4)^2 = (y+16)^2$$

$$y^2 - 8y + 16 = y^2 + 16$$

The solution set is $\{9\}$. (Use a comma to separate answers as needed.)

20. Solve the linear inequality. Graph the solution set on a number line, and express the solution using interval notation.

$$-4x + 8 \leq -3x + 3$$

$$-x \leq -5$$

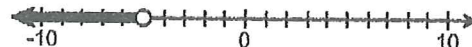
$$x \geq 5$$

Choose the correct graph below.

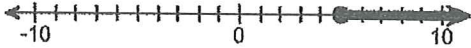
A.



B.



C.



D.



The solution in interval notation is $[5, \infty)$.

21. Solve the three-part linear inequality. Graph the solution set on a number line and express the solution using interval notation.

$$2 \left[11 \leq \frac{3x+4}{2} < 14 \right]$$

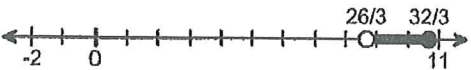
$$22 \leq 3x+4 < 28$$

$$18 \leq 3x < 24$$

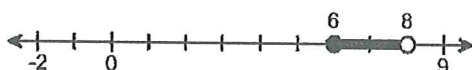
$$6 \leq x < 8$$

Choose the correct graph below.

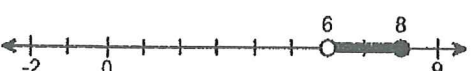
A.



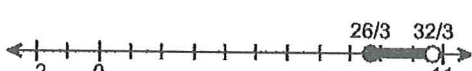
B.



C.



D.



The solution in interval notation is $[6, 8)$.

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

22. Solve the equation for x.

$$|8x - 1| + 1 = 20$$

$$|8x - 1| = 19$$

$$8x - 1 = 19 \text{ or } 8x - 1 = -19$$

$$8x = 20$$

$$x = \frac{5}{2}$$

$$8x = -18$$

$$x = -\frac{9}{4}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\left\{\frac{5}{2}, -\frac{9}{4}\right\}$.
(Simplify your answer. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)
- B. The solution set is \emptyset .

23. Solve.

$$|11x - 35| = -31$$

\emptyset

Absolute Value cannot be negative

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\{ \}$.
(Simplify your answer. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)
- B. The solution set is \emptyset .

24. Solve the inequality. Express the solution using interval notation.

$$|6 - 4x| \leq 1$$

$$6 - 4x \leq 1 \text{ and } 6 - 4x \geq -1$$

$$(OR) \quad -1 \leq 6 - 4x \leq 1$$

Select the correct choice below and fill in any answer boxes in your choice.

- A. The solution is $\left[\frac{5}{4}, \frac{7}{4}\right]$.
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type your answer in interval notation.)
- B. The solution set is \emptyset .

$$-7 \leq -4x \leq -5$$

$$\frac{7}{4} \geq x \geq \frac{5}{4}$$

$$\frac{5}{4} \leq x \leq \frac{7}{4}$$

25. Solve the inequality.

$$|x + 2| > 5$$

$$x + 2 > 5 \text{ or } x + 2 < -5$$

$$x > 3 \text{ or } x < -7$$

$$(-\infty, -7) \cup (3, \infty)$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution is $\underline{\hspace{2cm}}$. (Type your answer in interval notation.)
- B. The solution set is \emptyset .