

Name: _____ 8/1/2023

Answer all 25 questions in the space provided and put a box around your final answers.
Simplify all fractions and radical expressions. Good luck!

1. (4 points) Perform the indicated operation(s) and simplify as much as possible.

$$\frac{\frac{1}{2} - \frac{1}{7}}{1 - \frac{2}{7}}$$

2. (4 points) Simplify the expression and eliminate any negative exponents.

$$\left(\frac{2a^{-1}b}{a^3b^{-2}}\right)^{-4}$$

3. (4 points) Find all real solutions to the equation.

$$x(x + 6) = 1$$

4. (4 points) Factor the expression $(16a^4 - 81b^4)$ completely.

5. (4 points) Perform the multiplication $(4a^2 - 9b^2)^2$.

6. (4 points) Perform the indicated operation(s) and simplify as much as possible.

$$\frac{x^2 + 2x - 3}{x^2 + 8x + 16} \cdot \frac{3x + 12}{x - 1}$$

7. (4 points) Evaluate $25^{3/2}$.

8. (4 points) Find all real solutions to the equation.

$$\frac{1}{2}x + \frac{5}{2} = 7 - \frac{1}{4}x$$

9. (4 points) Perform the indicated operation(s) and simplify completely as one rational expression.

$$\frac{1}{x^2 - 2x} - \frac{1}{x^2 + 2x}$$

10. Give an equation of the line through $(3, -1)$ that is ...

(a) (2 points) horizontal.

(b) (2 points) vertical.

11. (4 points) Give an equation of the line through $(-6, 8)$ that is parallel to the line $5x + 4y = 3$.

12. (4 points) Find all real solutions to the equation.

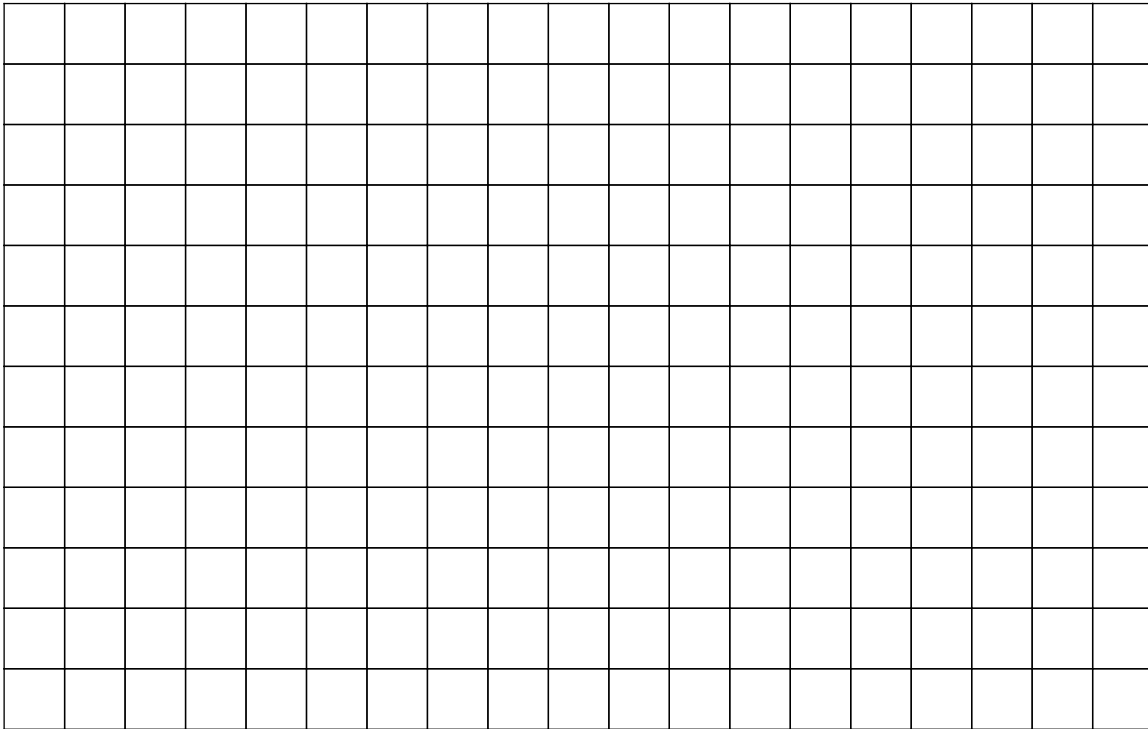
$$x - \sqrt{2x + 31} = 2$$

13. (4 points) Let $f(x) = x^2 + 3x$. Evaluate and simplify the expression $f(x + h)$.

14. (4 points) Sketch the graph

$$y = 4 - (x - 1)^2$$

not by plotting points but by starting with the graph of a standard function and applying transformations. Label any/all x -intercepts, y -intercepts, and/or asymptotes.



15. (4 points) Evaluate $\log_2\left(\frac{1}{16}\right)$.

16. Let $f(x) = 2x - 5$ and let $g(x) = 3 - x^2$. Evaluate and simplify the following expressions.

(a) (2 points) $f(g(4))$

(b) (2 points) $g(f(x))$

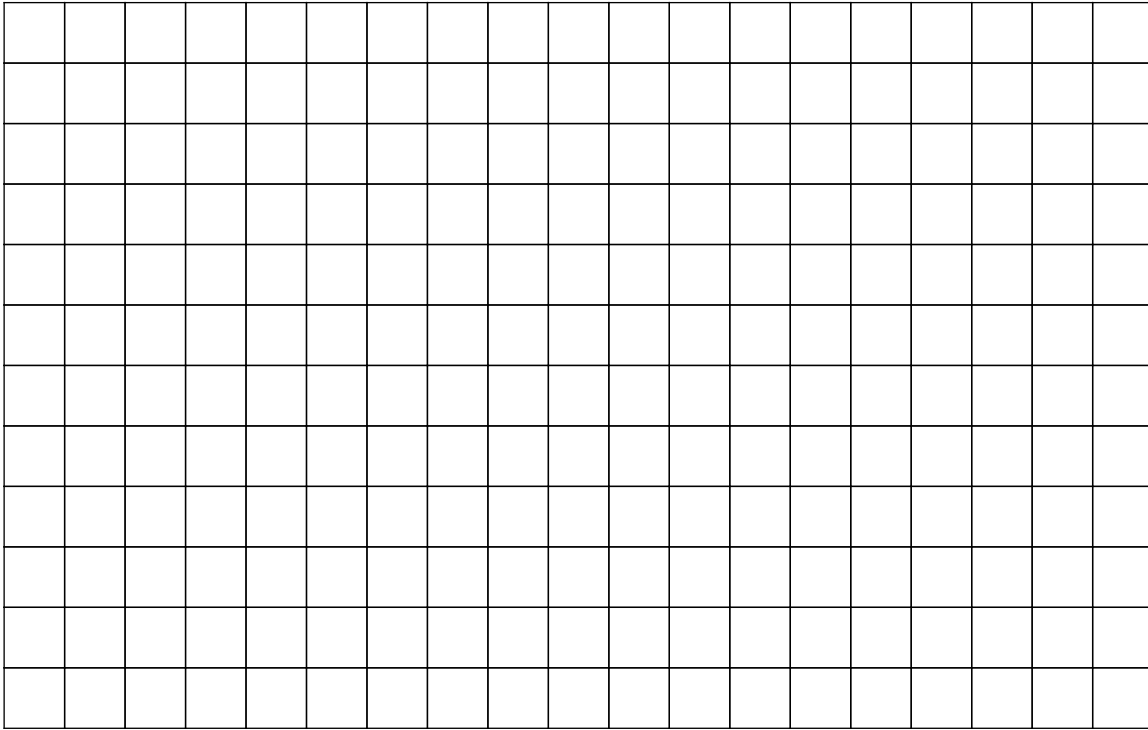
17. (4 points) The angle of elevation to the top of a building is found to be 26° at a distance of 45 meters from the building. Find the height of the building (you may leave your answer in terms of sin, cos, tan, etc).

18. (4 points) Find the exact value of $\cos\left(\frac{5\pi}{6}\right)$.

19. (4 points) Sketch the graph

$$y = 3^{-x} + 2$$

not by plotting points but by starting with the graph of a standard function and applying transformations. Label any/all x -intercepts, y -intercepts, and/or asymptotes.



20. (a) (2 points) Convert 72° to radians.

(b) (2 points) Convert $\frac{4\pi}{9}$ rad to degrees.

21. (4 points) Let $f(x) = \frac{2}{5x+3}$. Find $f^{-1}(x)$.

22. (4 points) Find all real solutions to the equation.

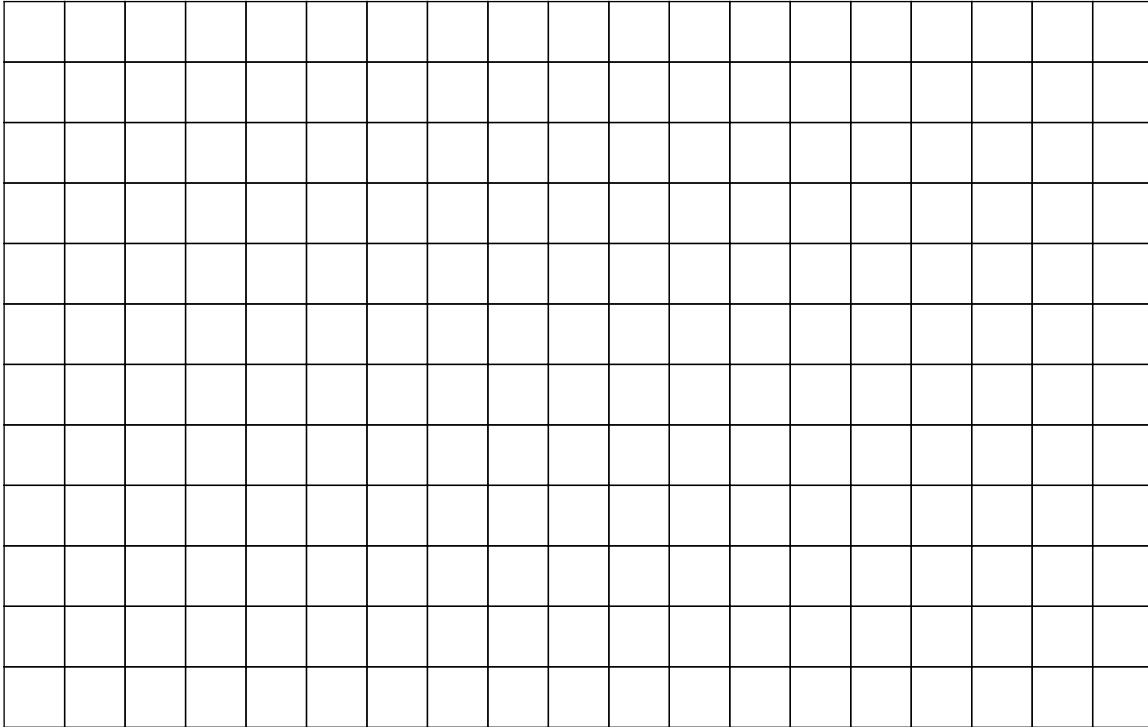
$$x(2x - 1) + (2x - 1)^2 = 0$$

23. (4 points) Use interval notation to state the solutions to the inequality.

$$x^2 \leq 2x + 15$$

24. (4 points) Sketch the graph of the piecewise defined function.

$$f(x) = \begin{cases} x^2 & \text{if } x \leq 1 \\ 2x - 2 & \text{if } x > 1 \end{cases}$$



25. (4 points) Give an equation for the circle that has center $(3, -2)$ and passes through the point $(0, 2)$.