

Math 101/120 Common Final Exam
Sample 2

1. Solve the inequality and graph the solution set on the number line: $\left| \frac{1}{2}x + 1 \right| - 2 < 1$
2. Find the equation of the line perpendicular to the graph of $3x + 2y = 5$ that contains the point $(6, -1)$. Write the equation of the line in slope-intercept form.
3. Solve the equation: $\frac{2}{3}x^2 - x = -\frac{1}{6}$
4. Solve the system by using matrices or Cramer's Rule:
$$\begin{aligned}x + y + z &= 0 \\ 2x + y - z &= 12 \\ 3x + 2y + 3z &= 3\end{aligned}$$
5. Solve the inequality and graph the solution set on the number line: $x^2 - x - 20 > 0$
6. Find the inverse function for $f(x) = \frac{x-2}{x+1}$. Write the equation using $f^{-1}(x)$ notation.
7. Let $f(x) = 2x - 1$ and $g(x) = x^2 + 3$. Find $(g \circ f)(x)$
8. Identify the type of graph, complete the square to find the center, and put the equation in standard form. (Do *not* graph.) $4x^2 + y^2 - 16x + 2y - 47 = 0$
9. Simplify as much as possible and express your answer using positive exponents: $\left(\frac{3x^2y^{-3}}{x^5y^{-7}} \right)^{-2}$
10. Simplify: $\frac{2n^2 - 3n - 2}{8n^3 + 1} \div \frac{2n^2 - 9n + 10}{4n^2 - 8n - 5}$
11. How many liters of 40% acid solutions and 5% acid solution should be mixed to get 7 liters of 20% acid solution?
12. Solve completely: $t^4 - 2t^2 = 15$
13. Solve the system algebraically:
$$\begin{aligned}x^2 + y^2 &= 16 \\ x + 2y &= 8\end{aligned}$$
14. For $f(x) = x^2 + 5$, use **one** of the given formulas to find the difference quotient.

$$\frac{f(x+h) - f(x)}{h}$$

OR

$$\frac{f(x) - f(a)}{x - a}$$

15. Graph the solution set for the system.

$$x - y \geq -1$$

$$y \geq x^2 - 1$$

16. Solve the equation:

$$\frac{2x}{x^2 - 9} - \frac{x}{x - 3} = \frac{1}{x + 3}$$

17. Identify the vertex and graph:

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

18. Find a_{41} and S_{41} for the sequence 2, 5, 8, . . .

19. Factor completely: $x^3 + 6x^2 - 4x - 24$

20. How long will it take for \$3,000 to double if it is invested at 6% interest compounded quarterly?
(Round your answer to the nearest tenth of a year.)

21. Find the 6th term of $(3x - y)^8$ and simplify completely.

22. Graph: $\frac{x^2}{16} - \frac{y^2}{25} = 1$

23. Solve the equation: $\log_3 x + \log_3 (x - 2) = 1$

24. Sketch the graph of $y = \log_2 x$.

25. Solve: $\sqrt{12 - x} + 2x = 3$.