

# Combined Math 99 Midterm

Name \_\_\_\_\_

## Version 4 - Practice

Directions: You must show all work except on multiple choice questions.

### Multiple Choice: Problems 1 - 9

(2 pts each)

- Express the solution to the compound inequality  $x < -2$  OR  $x \geq 1$  in interval notation.  
a)  $(-2, 1]$       b)  $(-\infty, \infty)$       c)  $(-\infty, -2)$       d)  $[1, \infty)$   
e)  $(-\infty, -2) \cup [1, \infty)$
- Express the solution to the compound inequality  $x > 4$  AND  $x \geq 2$  in interval notation.  
a)  $[2, 4)$       b)  $(4, \infty)$       c)  $(-\infty, 2]$       d)  $(-\infty, 2] \cup (4, \infty)$       e) none of these
- Evaluate  $(-8)^{-4/3}$   
a)  $\frac{1}{16}$       b) 16      c)  $-\frac{1}{16}$       d) -16      e) None of these
- Multiply and simplify the complex number:  $(3 - 6i)^2$   
a) -27      b)  $45 - 36i$       c)  $-27 - 36i$       d) 45      e) None of these
- Rationalize the denominator:  $\frac{4}{\sqrt[3]{7}}$   
a)  $\frac{4\sqrt[3]{49}}{7}$       b)  $\frac{4\sqrt[3]{7}}{7}$       c)  $\frac{\sqrt[3]{28}}{7}$       d)  $\frac{64}{7}$       e) None of these
- Find the value of  $f(-3)$  if  $f(x) = \begin{cases} 2x - 1 & \text{if } x < -3 \\ 5 & \text{if } -3 \leq x < 2 \\ x + 1 & \text{if } x \geq 2 \end{cases}$   
a) -7      b) 5      c) -2      d) -1      e) None
- Which values of  $x$  make the function  $f(x) = \frac{x+3}{x-7}$  undefined?  
a) 7      b) -3      c) -3 and 7      d) -7 and 3      e) None of these
- What is the domain of the linear function  $f(x) = 5 - 4x$ ?  
a)  $\{5\}$       b)  $(-\infty, 5]$       c)  $[5, \infty)$       d)  $(-\infty, \infty)$       e) None of these
- Simplify the expression  $\sqrt[3]{32a^5b^3c}$   
a.  $ab\sqrt[3]{32a^2c}$       b.  $2ab\sqrt[3]{4a^2c}$       c.  $2a^2b\sqrt[3]{4ac}$       d.  $2a^2b\sqrt[3]{2ac}$

**Show all your work.**

10. Solve for  $x$  :  $|3x - 5| = |x - 4|$

3 pts

11. Solve for  $x$ : Express your answer in interval notation

$|5x - 2| \leq 4$

3 pts

12. Solve for  $x$ : Express your answer in interval notation

$|3 - 2x| > 7$

3 pts

13. Solve for  $x$  : Express your answer in interval notation.

8 pts

a)  $|4x - 5| \leq -1$  \_\_\_\_\_

b)  $|4x - 5| = -2$  \_\_\_\_\_

c)  $|4x - 5| > -1$  \_\_\_\_\_

d)  $|4x - 5| > 0$  \_\_\_\_\_

14. Let  $f(x) = -x^2 + 2x + 1$ . Completely simplify each answer.

5 pts

a)  $f(-1) =$

b) Find and simplify completely the difference quotient  $\frac{f(a+h)-f(a)}{h}$

15. Solve the radical equation  $\sqrt{x+1} - \sqrt{x-1} = 2$ . Be sure to check all "solutions".

4 pts

Simplify the following radical expressions. Rationalize all denominators.

16.  $-\sqrt{\frac{64x^8}{81y^6}}$  3 pts

17.  $-2\sqrt{72} - 4\sqrt{98}$  3 pts

18.  $\sqrt{12x^2y} \cdot \sqrt{75x^3y^3}$  3 pts

19.  $\sqrt{\frac{24}{7}}$  3 pts

20.  $(3\sqrt{7} - 2)(\sqrt{7} + 5)$  3 pts

21. Perform the indicated operation:

3 pts each

a)  $\frac{3}{x+3} - \frac{5}{x^2-9} + \frac{2}{x-3}$

b)  $\frac{4x-8}{3x^2-x} \cdot \frac{(x+2)^2}{4-x^2}$

c)  $\frac{36n^2-64}{3n^2-10n+8} \div \frac{3n^2-8n-16}{n^2-4}$

22. Simplify the complex fraction completely:  $\frac{\frac{2}{x} + \frac{x}{2}}{\frac{2}{x} - \frac{x}{2}}$

4 pts

23. Solve the rational equation:  $\frac{3}{t-1} - \frac{2}{t+3} = \frac{5-6t}{t^2+2t-3}$  Be sure to check all "solutions".

4 pts

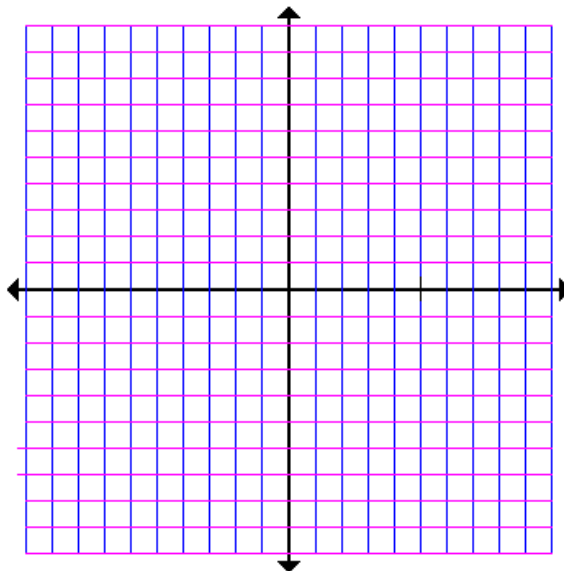
24. In 2 minutes, a conveyor belt moves 300 pounds of aluminum from a delivery truck to a storage area. If the belt works together with a smaller belt and together they complete the job in  $1\frac{1}{2}$  minutes, find how long it would take the smaller belt to do the job on its own?

4 pts

25. Graph the solutions of the system of linear inequalities:

4 pts

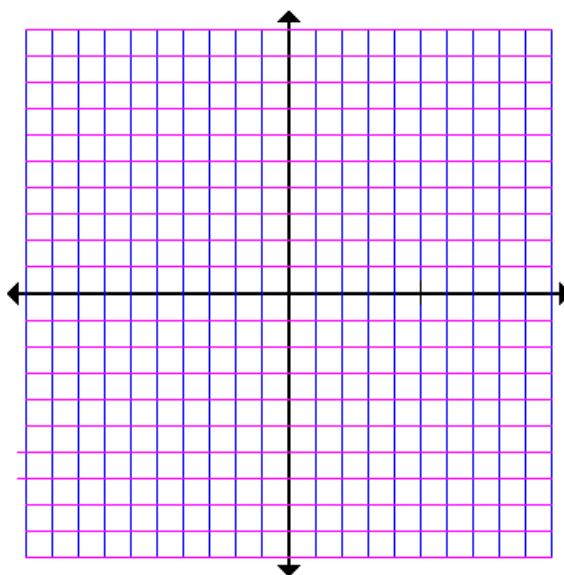
$$\begin{cases} y + 2x \geq 0 \\ 5x - 3y \leq 12 \\ y \leq 2 \end{cases}$$



26. Let  $f(x) = -\sqrt{x-5} + 1$ .  
List the transformations being applied and graph  $f(x)$ .  
Also, find the domain and range of  $f(x)$ .

8 pts

Transformations:

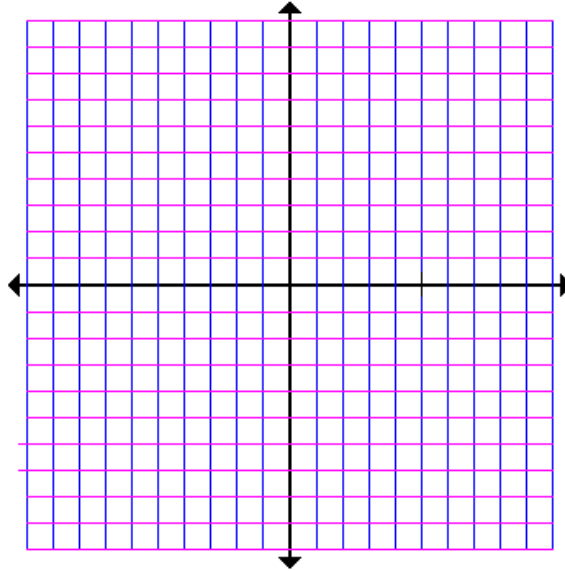


Domain of  $f(x)$  \_\_\_\_\_

Range of  $f(x)$  \_\_\_\_\_

27. Graph the function:  $f(x) = \begin{cases} 4x & x > -1 \\ 3x + 1 & x \leq -1 \end{cases}$   
 Also, find the domain and range of  $f(x)$ .

8 pts



Domain of  $f(x)$  \_\_\_\_\_

Range of  $f(x)$  \_\_\_\_\_

Answers:

- 1. e
- 2. b
- 3. a
- 4. c
- 5. a
- 6. b
- 7. a
- 8. d
- 9. b

10.  $\frac{1}{2}, \frac{9}{4}$

11.  $[-\frac{2}{5}, \frac{6}{5}]$

12.  $(-\infty, -2) \cup (5, \infty)$

13a. no solution    13b. no solution    13c.  $(-\infty, \infty)$     13d.  $(-\infty, \frac{5}{4}) \cup (\frac{5}{4}, \infty)$

14a. -2    14b.  $-2a - h + 2$

15. no solution

16.  $-\frac{8x^4}{9y^3}$

17.  $-40\sqrt{2}$

18.  $30x^2y^2\sqrt{x}$

19.  $\frac{2\sqrt{42}}{7}$

20.  $11 + 13\sqrt{7}$

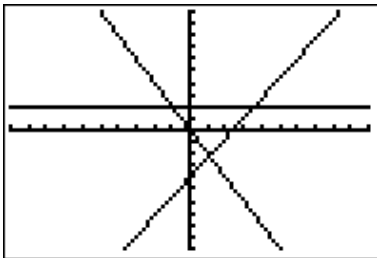
21a.  $\frac{5x-8}{x^2-9}$     21b.  $-\frac{4(x+2)}{x(3x-1)}$     21c.  $\frac{4(n+2)}{(n-4)}$

22.  $\frac{4+x^2}{4-x^2}$

23.  $-\frac{6}{7}$

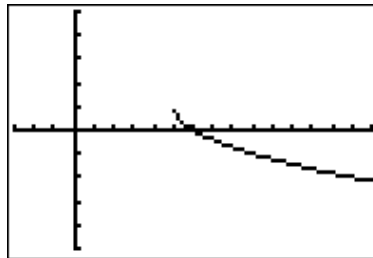
24. 6 minutes

25.

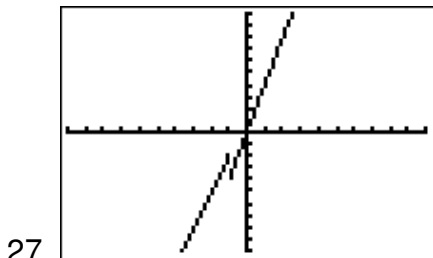


shade inside triangle

26. Reflection over x-axis, Right 5, Up 1



D:  $[5, \infty)$  R:  $(-\infty, 1]$



27. D:  $(-\infty, \infty)$  R:  $(-\infty, \infty)$