

# MTH 28, Midterm 2, V. 3, 10/23/24

Prof. Luis Fernández

NAME: \_\_\_\_\_ SOLUTION \_\_\_\_\_

There are 19 questions. Some are multiple choice and some are free response.  
Each question is worth 6 points over 100 (so 14 points are extra credit).  
For multiple-choice questions, just circle your answer.  
For free-response questions, SHOW ALL WORK to receive credit.

1. Divide and simplify your answer.

$$\frac{x^2 + 7x}{10} \div \frac{x + 7}{2}$$

**Solution:**

$$\frac{x}{5}$$

2. Divide and simplify your answer.

$$\frac{x^2 - 25}{x^2 - 11x + 30} \div \frac{x}{x - 6}$$

**Solution:**

$$\frac{x + 5}{x}$$

3. Add and simplify.

$$\frac{x - 1}{x + 4} + \frac{x + 3}{x + 2}$$

**Solution:**

$$\frac{2x^2 + 8x + 10}{(x + 4)(x + 2)}$$

4. Multiply and simplify your answer.

$$\frac{x - 4}{x} \cdot \frac{x^2 + 3x}{x^2 - x - 12}$$

**Solution:**

$$1$$

5. Multiply and simplify

$$\frac{x^2 - x - 30}{x^2 - 10x + 24} \cdot \frac{x^2 - 16}{x^2 + 8x + 16}$$

**Solution:**

$$\boxed{\frac{x + 5}{x + 4}}$$

6. Simplify the expression

$$\frac{x^2 - 4}{x^2 - 3x + 2}$$

**Solution:**

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

7. Simplify the rational expression.

$$\frac{x^2 - 2x - 8}{x - 4}$$

**Solution:**

$$\boxed{x + 2}.$$

8. Multiply and simplify your answer.

$$\frac{x^2 - 4}{x^2 - 3x + 2} \cdot \frac{x - 1}{x}$$

**Solution:**

$$\boxed{\frac{x + 2}{x}}$$

9. Add and simplify

$$\frac{5}{y-3} + \frac{3}{y+5}$$

**Solution:**

$$\frac{8y+16}{(y-3)(y+5)} \text{ or } \frac{8(y+2)}{(y-3)(y+5)}$$

11. Subtract and simplify

$$\frac{1}{x+3} - \frac{1}{x+4}$$

**Solution:**

$$\frac{1}{(x+3)(x+4)}$$

10. Match the expressions below with the letters labeling their equivalent expressions.

**A** 1.  $\frac{1}{x-3} + \frac{1}{x^2-9}$

**C** 2.  $\frac{1}{x+3} + \frac{1}{x^2+9}$

**B** 3.  $\frac{1}{x-3} + \frac{1}{x^2+9}$

A.  $\frac{x+4}{x^2-9}$

B.  $\frac{x^2+x+6}{(x-3)(x^2+9)}$

C.  $\frac{x^2+x+12}{(x+3)(x^2+9)}$

**Solution:**

$$\frac{1}{(x+3)(x+4)}$$

12. Subtract and simplify

$$\frac{2x}{x^2+3x-4} - \frac{1}{x-1}$$

**Solution:**

$$\frac{x-4}{(x-1)(x+4)}$$

13. Simplify the expression

$$\frac{1 + \frac{4}{c-4}}{1 - \frac{4}{c-4}}$$

**Solution:**

$$\boxed{\frac{c}{c-8}}$$

14. Simplify the expression

$$\frac{\frac{x^3}{x-7}}{\frac{x^7}{x^2-2x-35}}$$

**Solution:**

$$\boxed{\frac{x+5}{x^4}}$$

15. Add and simplify

$$\frac{5}{x^2} + \frac{2}{x^2+x}$$

**Solution:**

$$\boxed{\frac{7x+5}{x^2(x+1)}}$$

16. Solve the following equation:

$$\frac{x+1}{x-1} = \frac{-10}{x+3} + \frac{8}{x^2+2x-3}$$

**Solution:**  $x = -15$ . Note that  $x = 1$  is not a solution.

17. Solve the following equation:

$$x + \frac{1}{x} = 2$$

**Solution:**  $x = 1$ .

18. Solve the following equation:

$$\frac{4}{x^2 - 25} + \frac{3}{x - 5} = \frac{2}{x + 5}$$

**Solution:**  $x = -29$ .

19. Solve the equation:  $\frac{x}{4x - 12} - \frac{x - 4}{x - 3} = 1$ .

**Solution:**  $x = 4$ .