

MTH 28, Midterm 1, V. 3, 06/10/26

Prof. Luis Fernández

NAME: _____

There are 22 questions. Some are multiple choice and some are free response.
Each question is worth 5 points over 100 for a total of 110 (so 10 points are extra credit).
For multiple-choice questions, just circle your answer.
For free-response questions, SHOW ALL WORK to receive credit.
No electronics or notes allowed except a 4-function calculator (permitted but not needed).

1. Factor completely:

$$4x^2 - 9$$

2. Factor completely: $45x^2y - 20y^3$

Circle the answer.

- (a) $5(9x^2y - 4y^3)$
- (b) $5y(9x^2 - 4y^2)$
- (c) $5y(3x - 2y)(3x + 2y)$
- (d) $5y(3x - 2y)^2$

3. Solve the equation

$$n^2 + 8n + 7 = 0.$$

4. Factor completely:

$$x^2 - x - 6$$

5. Factor completely:

$$8x^2 - 2x - 1$$

6. Factor completely: $6x^4 - 9x^3$

7. Factor completely:

$$y^2 - 7y + 4y - 28$$

8. Factor completely:

$$25x^2y^4 + 10xy - 15x$$

9. Solve the equation

$$7z - z^2 = 0.$$

10. Given the function $f(x) = 3x^2 + 5x - 2$, calculate the following values:

• $f(0) =$ _____

• $f(2) =$ _____

• $f(-2) =$ _____

• $f(x + 1) =$ _____

• $f(-x) =$ _____

11. Solve the equation

$$3w^3 - 27w^2 + 54w = 0.$$

12. Solve the equation

$$x(x - 18) = -72.$$

13. Simplify the expression

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

14. Simplify the rational expression.

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

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

16. Simplify the expression

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

17. Subtract and simplify

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

18. Add and simplify.

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

19. Divide and simplify your answer.

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

20. Multiply and simplify

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

21. Solve the following equation:

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

22. Solve the following equation:

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