

MTH 28, Midterm 1, V. 3, 09/25/24

Prof. Luis Fernández

NAME: _____ SOLUTION _____

There are 18 questions. Some are multiple choice and some are free response.
Each question is worth 6 points over 100 for a total of 108 (so 8 points are extra credit).
For multiple-choice questions, just circle your answer.
For free-response questions, SHOW ALL WORK to receive credit.

1. Factor:

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

Solution: $(2x - 1)(4x + 1)$

2. Factor the difference of squares:

$$4x^2 - 9$$

Solution: $(2x + 3)(2x - 3)$

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

Circle the answer.

Solution:

(a) $5(9x^2y - 4y^3)$

(b) $5y(9x^2 - 1024y^2)$

(c) $5y(3x - 2y)(3x + 2y)$

(d) $5y(3x - 2y)^2$

4. Factor:

$$x^2 - x - 6$$

Solution: $(x - 3)(x + 2)$

5. Factor:

$$x^2 + 8x + 15$$

Solution: $(x + 5)(x + 3)$.

6. Factor out the greatest common factor (GCF).

$$6x^4 - 9x^3$$

Solution: $3x^3(2x - 3)$

7. Factor by grouping:

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

Solution: $(y + 4)(y - 7)$.

8. Factor out the greatest common factor (GCF).

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

Solution: $5x(5xy^4 + 2y - 3)$

9. Factor completely: $30x^2y + 5xy - 60y$

Circle the answer.

Solution:

(a) $5y(3x - 4)(2x + 3)$

(b) $xy(15x + 65)$

(c) $5y(6x^2 + x - 12)$

(d) $y(30x^2 + 5x - 60)$

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

Solution:

• $f(0) = -2$

• $f(2) = 20$

• $f(-2) = 0$

• $f(x + 1) = 3(x + 1)^2 + 5(x + 1) - 2$

• $f(-x) = 3x^2 - 5x - 2$

10. For the polynomial $x^2 + x^5 - 3x - 5$,

a) Determine the coefficient and the degree of each term.

Solution:

Term	Coefficient	Degree
x^2	1	2
x^5	1	5
$-3x$	-3	1
-5	-5	0

b)

The degree of the polynomial is 5,

The leading term is x^5 ,

The leading coefficient is 1.

12. Solve the equation

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

Solution: 0 and 7.

13. Solve the equation: $6x^2 + 3 = 11x$.

Solution:

$$x = \frac{3}{2}, x = \frac{1}{3}$$

14. Find all real number solutions for the equation

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

Solution:

$$x = 6, x = 12$$

15. Let $f(x) = \frac{x + 7}{3x - 3}$.

Compute the following values.

If one is not defined, type *Undefined*.

Solution:

• $f(0) = \boxed{-\frac{7}{3}}$

• $f(2) = \boxed{3}$

• $f(1) = \boxed{\text{Undefined}}$

16. Solve the equation

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

Solution:

$$w = 0, w = 3, w = 6.$$

17. Evaluate the function $g(x) = -4$ at the given values:

Solution:

• $g(0) = \boxed{-4}$

• $g(2) = \boxed{-4}$

• $g(-5) = \boxed{-4}$

• $g(x + 1) = \boxed{-4}$

18. Solve the equation

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

Solution: $\boxed{-1 \text{ and } -7}$.

