

# MTH 28, Midterm 1, V. 1, 02/28/24

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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 out the greatest common factor (GCF).  
 $6x^4 - 9x^3$

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

2. Factor by grouping:  
 $y^2 - 7y + 4y - 28$

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

3. Factor out the greatest common factor (GCF).  
 $25x^2y^4 + 10xy - 15x$

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

4. Factor:  
 $x^2 - x - 6$

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

5. Factor:

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

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

6. Factor:

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

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

7. Factor the difference of squares:

$$4x^2 - 9$$

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

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

**Circle the answer.**

**Solution:**

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

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

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

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

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

Circle the answer.

Solution:

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

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

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

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

10. Solve the equation

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

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

11. Solve the equation

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

Solution:  $\boxed{0 \text{ and } 7}$ .

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

Solution:

•  $f(0) = \boxed{-2}$

•  $f(2) = \boxed{20}$

•  $f(-2) = \boxed{0}$

•  $f(x + 1) = \boxed{3(x + 1)^2 + 5(x + 1) - 2}$

•  $f(-x) = \boxed{3x^2 - 5x - 2}$

13. 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  $\boxed{5}$ .

The leading term is  $\boxed{x^5}$ .

The leading coefficient is  $\boxed{1}$ .

15. 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:**

$$x = 6, x = 12$$

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

**Solution:**

•  $g(0) = \boxed{-4}$

•  $g(2) = \boxed{-4}$

•  $g(-5) = \boxed{-4}$

•  $g(x + 1) = \boxed{-4}$

17. Solve the equation

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

**Solution:**

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

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

Compute the following values.

If one is not defined, type *Undefined*.

**Solution:**

•  $f(0) = \boxed{-\frac{7}{3}}$

•  $f(2) = \boxed{3}$

•  $f(1) = \boxed{\text{Undefined}}$

