MTH 28, Midterm 1, V. 1, 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 out the greatest common factor (GCF).
$6x^4 - 9x^3$

Solution: $\boxed{3x^3(2x-3)}$

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

Solution: $\boxed{(y+4)(y-7)}$.

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

Solution: $\boxed{5x(5xy^4 + 2y - 3)}$

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

Solution: $\boxed{(x-3)(x+2)}$

5. Factor:

$x^2 + 8x + 15$

Solution: $\boxed{(x+5)(x+3)}$.

6. Factor:

$8x^2 - 2x - 1$

Solution: $\boxed{(2x-1)(4x+1)}$

7. Factor the difference of squares:

$4x^2 - 9$

Solution: $\boxed{(2x+3)(2x-3)}$

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

Circle the answer.

Solution:

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

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

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

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

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 $\boxed{1}$.

14. Find all real number solutions for the equation

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

Solution:

$x = 6$, $x = 12$

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

Solution:

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

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 $f(x) = \dfrac{x+7}{3x-3}$.

Compute the following values.
If one is not defined, type *Undefined.*
Solution:

- $f(0) = \boxed{-\dfrac{7}{3}}$
- $f(2) = \boxed{3}$
- $f(1) = \boxed{\text{Undefined}}$