

University of Bahrain
Department of Mathematics
MATHS101: Calculus I
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Worksheet: Preliminaries

Students' Name: _____

1. Let $f(x) = \frac{x-5}{x^2+3}$. Find

- $f(5)$

- $f(2x)$

- $f(x+h)$

- $f(-7)$

2. Let $f(x) = 2x^2 - x + 1$. Find $\frac{f(x) - f(2)}{x - 2}$.

Dr. Abdulla Eid

3. Consider the following function:

$$f(x) = \begin{cases} 3x^3 + 2x - \frac{6}{x-2}, & x > 2 \\ 3 - x^2, & x = 2 \\ 4x - 8, & x < 2 \end{cases}$$

Find the following: $f(0), f(1), f(2), f(3), f(0.5), f(-1), f(-2)$.

4. Classify the following functions as linear, quadratic, polynomial, rational, algebraic, or transcendental:

1. $f(x) = \sqrt{3x+1}$

2. $f(x) = \frac{2x+1}{x^9}$

3. $f(x) = x^2 + 5$

4. $f(x) = 3x - 1 + 5^x$

5. $f(x) = \frac{\sin x + 1}{\cos x}$

6. $f(x) = 2017x^5 + 3x^3 + x + 12$

5. Factor each of the following polynomials:

1. $3xy + 2 - 3x - 2y$

2. $4y^4 + y^2 + 20y^3 + 5y$

3. $2x^2 + 13x - 7$

4. $3x^2 + 11x + 6$

5. $x^2 - 4$

6. $4x^2 - 25$

7. $-6x^2 - 13x + 5$

8. $x^2 + 12x + 36$

9. $x^3 - 1$

Dr. Abdulla Eid

10. $x^3 + 8$

11. $64x^3 + 27$

12. $x^5 - 1$

13. $x^7 + 1$

14. $x^6 - 32$

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