



SCHOOL OF APPLIED SCIENCE & HUMANITIES
DEPARTMENT OF MATHEMATICS

Subject: Foundations of Engineering Mathematics

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Section: 20,26,31,32

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Unit 2: Functions
Tutorial Questions

1. Define a function and give an example of a function that is neither even nor odd.
2. Determine whether $f(x) = |x|$ is even, odd, or neither.
3. If $f(x) = 3x + 2$, find $f(-2)$.
4. State the condition for a function to be one-to-one.
5. Determine if $f(x) = x^2$ is one-to-one over the set of real numbers.
6. Find the domain of $f(x) = 1 / (x - 3)$.
7. Find the range of $f(x) = \sqrt{(x - 1)}$.
8. Determine the domain of $f(x) = \ln(x + 4)$.
9. If $f(x) = \sqrt{(9 - x^2)}$, find the domain.
10. Find the range of $f(x) = (x^2 - 1)/(x^2 + 1)$.
11. If $f(x) = 2x + 3$ and $g(x) = x^2$, find $(f \circ g)(x)$.
12. If $f(x) = \sqrt{x}$ and $g(x) = x - 2$, find $(g \circ f)(x)$.
13. Given $f(x) = 1/x$ and $g(x) = x + 5$, find $(f \circ g)(2)$.
14. If $f(x) = 3 - x$ and $g(x) = x^2$, find $(g \circ f)(x)$.
15. Determine if composition of functions is commutative.
16. Give an example of a polynomial function of degree 3.
17. Give an example of an exponential function.
18. Give an example of a rational function.
19. Give an example of a piecewise-defined function.
20. Give an example of a periodic function.
21. Define the inverse of a function.
22. Find the inverse of $f(x) = 2x + 5$.
23. Determine if $f(x) = x^3 + 2$ has an inverse.
24. Find the inverse of $f(x) = (x - 3)/(x + 2)$.
25. Show that $f(x) = e^x$ and $f^{-1}(x) = \ln(x)$ are inverses.
26. Factorize $x^2 - 9$.
27. Factorize $x^3 - 8$.
28. Factorize $x^2 + 5x + 6$.

29. Factorize $x^3 + 27$.
30. Factorize $x^4 - 16$.
31. Solve $x^2 - 5x + 6 = 0$.
32. Solve $2x^2 + 3x - 2 = 0$.
33. Find the discriminant of $x^2 - 4x + 4 = 0$ and comment.
34. Solve $x^2 + x + 1 = 0$.
35. Find the roots of $4x^2 - 4x + 1 = 0$.
36. Solve $x - 3 > 0$.
37. Solve $2x + 5 \leq 9$.
38. Solve $|x - 2| < 5$.
39. Solve $3x - 7 \geq 2x + 4$.
40. Solve $-2x + 1 < 5$.
41. Explain why a function can't have two different outputs for the same input.
42. Can the graph of a function intersect a vertical line more than once?
43. If $f(x) = x^2$, what is $f(\sqrt{2}) + f(-\sqrt{2})$?
44. Find all x such that $f(x) = f(-x)$ for $f(x) = x^3 - x$.
45. If $f(x) = x + 1/x$, find $f(2) + f(1/2)$.
46. Solve for x : $\sqrt{x+1} - \sqrt{x} = 1$.
47. If $f(x) = ax + b$ and $f^{-1}(x) = 2x - 3$, find a and b .
48. If $f(x) = x^2$ and $g(x) = \sqrt{x}$, is g the inverse of f ?
49. For which values of k is $x^2 + kx + 4 = 0$ having equal roots?
50. If $f(x) = 2x^2 - 3x + 1$, find $f(1) + f(-1)$.