1. **Domains and Relation**
2. Given the relation ***B* = {(−1, 3), (−1, −2), (0,1), (2, 4)},** determine its domain and range.
3. For the relation ***C* = {(*x*, *y*) ∣ *y* = 2*x* + 1, where *x* ∈ R},** identify the domain and range.
4. Given the relation ***F* = {(*x*, *y*) ∣ *y* = ​}**, identify the domain and range.
5. For the relation ***G* = {(*x*, *y*) ∣ *y* = ​, *x* ≠ 0}**, find the domain and range.
6. Given the relation ***I* = {(*x*, *y*) ∣ *y* = },** find the domain and range.
7. **Function and Functional Notation**
8. Given the function ***f* (*x*) = 2*x* + 3**, find *f*(1), *f*(−2), and *f*(*a*).
9. If ***g*(*x*) = + 4*x* − 7**, calculate *g*(2), *g*(−3), and *g*(*a*).
10. Given ***h*(*x*) = ​ + 2**, determine *h*(3), ℎ(−4), and ℎ(*a*)
11. **Limit of a function and Its Properties**
12. **Symbols used for Derivatives of Algebraic Functions and Three-Step Rule**
13. Using the three-step rule, find the first derivative *f*′(*x*) for the function ***f*(*x*) = 3*x*2 + 2*x* −5.**
14. Find the first derivative *f*′(*x*) for ***f*(*x*) =**  ​ using the three-step rule
15. Using the three-step rule, determine *f*′(*x*) for the function ***f*(*x*) = *.***
16. **Differentiation Formulas**
17. *f*(*x*) = 4*x*3 − 2*x*2 + 3*x* – 5
18. *f*(*x*) =
19. *f*(*x*) = (2*x*2 − 3*x* +1)(3*x*3 + 2*x* − 5)
20. *f*(*x*) =
21. *f*(*x*) = e*2x sin*(*x*)
22. **Implicit Differentiation**
23. Find the derivative of the implicit function ***x2*+ *y2*= 25.**
24. Find the derivative​ of the implicit function ***xy* + *x2y*2 − 2*x*3 = 0.**
25. Given the implicit function ***x*3 + *y*3 − 3*xy* = 0.**
26. **Higher Derivatives**
27. f(x) = 4x3 − 6x2 + 2x – 5
28. f(x) =
29. g(x) =
30. **Tangent & Normal Lines**
31. Find the equations of the tangent and normal lines to the curve *y* = *x*3 – 4*x* + 2 at the point *x* = 2.
32. Determine the equation of the line tangent to the curve *y* = *x*2 + 3*x* + 1 at the point (1, 5).
33. Find the equations of the tangent and normal lines to the curve *y* = 4*x*2 − 6*x* + 5 at the point *x* = −1.
34. **Instantaneous Velocity and Acceleration**
35. A particle moves along a straight line according to the law *s* = *t*2− 4*t* + 3. Determine whether the particle is moving to the right or left at *t* = 2.
36. Given the law of motion *s* = 4*t*3 − 6*t*2 + 2*t* + 1, find the velocity and acceleration. Determine the times, if any, when the velocity is zero.
37. Consider a particle moving along a straight line described by the law *s* = *t*4 − 8*t*2 + 6*t* + 2. Determine when the particle is moving to the right and when it is moving to the left. Discuss the nature of acceleration.
38. **Projectile Motion**
39. A ball is thrown vertically upward from the ground with an initial velocity of 30 m/s. If the height at any time is given by the law *s* = 30*t* − 5*t*2, determine the maximum height the ball will reach, the time the ball will reach that height, and the time when the ball hits the ground.
40. An object is thrown directly upward with an initial velocity of 40 feet per second. If the height at any time is given by *s* = 40*t* − 16*t*2, find:
    1. The maximum height attained.
    2. The velocity of the object and its direction at the end of 2 seconds.
    3. How long it takes for the object to return to its original position.
41. A rocket is launched vertically upward from the ground with an initial velocity of 80 m/s. If the height at any time is given by *s* = 80*t* − 5*t*2, determine:
    1. The maximum height the rocket will reach.
    2. The time taken for the rocket to reach its maximum height.
    3. The time when the rocket will return to the ground.
42. **Curve Tracing**
43. Find the relative maximum point, relative minimum point, point of inflection (if any), and sketch the graph of the equation *y*= 2*x*3 − 6*x*2 + 5*x* − 3.
44. For the function *y* = *x*4 − 4*x*3 + 6*x*2 − 4*x* + 1, determine the relative maximum point, relative minimum point, point of inflection (if any), and sketch the graph.
45. Given the function *y* = 3*x*4 − 8*x*3 + 6*x*2 − 12*x* + 2, find the relative maximum point, relative minimum point, point of inflection (if any), and sketch the graph.