Functions of One Variable Problem Set

1. Define the domain and range of the function $f(x) = 2x + 3$.

2. Find the slope and intercept of the linear function that passes through the points (1,2) and (3,8).

3. Determine the vertex of the quadratic function $g(x) = x^2 - 4x + 3$.

4. Sketch the graph of the function $f(x) = |x - 2|$.

5. For the function $f(x) = \sqrt{x + 4}$, find the domain and express x in terms of y.

6. If $V(t) = Pe^{rt}$ is the formula for compound interest, solve for t given that $V(t) = 2P$ and $r = 0.05$.

7. Explain why the function $f(x) = x^2$ is not a one-to-one function.

8. Based on an initial population P_0, write a function that models a population that triples every year.

9. Find the x-intercepts of the function $f(x) = x^2 - 5x + 6$.

10. Evaluate $f(3)$ for the function $f(x) = x^3 - 6x^2 + 9x - 4$.

11. Compute the intercepts of the function $g(x) = -2x + 5$.

12. Given the function $h(x) = \sqrt{x - 1}$, determine the domain and range.

13. Find the y-coordinate of the vertex of the parabola $y = -3x^2 + 12x - 7$.

14. Solve the equation $5^{2x} = 125$ for x.

15. If the growth of bacteria is represented by $N(t) = N_0 e^{kt}$, find k given that the population doubles every 2 hours.

16. Simplify the expression $\log_{10} 1000 - \log_{10} 10$.

17. Determine for which x the function $f(x) = (x - 1)^2$ has a value of 9.

18. Given the cost function $C(x) = 50\sqrt{x} + 400$, find the cost of producing 25 goods.

19. Find the domain of the function $g(x) = \frac{2}{x-5}$.

20. Determine the domain of the function $h(x) = \sqrt{5x - 10}$.

21. Verify whether the number 2 is in the image of $p(x) = \frac{4x+8}{2x-3}$.

22. If the linear relationship between two quantities, x and y, is given by the equation $y = 3x + 12$, find the value of y when $x = 10$.

23. Having \$150 savings, if you invest it for 5 years, how much more would you earn with a 4% compound interest compared to a 2.5% compound interest?

24. Solve for x: $e^x = \frac{1}{5}$

25. Solve for x: $\log_3(9x) = 2$

26. Solve for x in the equation $4^{2x} = \frac{1}{16}$.