1. Find the length of the curve \( x = e^t \cos(t), \ y = e^t \sin(t); \ 0 \leq t \leq \pi \).

2. Find the length of the curve \( x = 3t - t^3, \ y = 3t^2; \ 0 \leq t \leq 2 \).

3. Find the length of the curve \( x = y^{2/3}; \ 0 \leq y \leq 1 \).

4. Find the length of the curve \( x = a(\cos(\theta) + \theta \sin(\theta)); \ y = a(\sin(\theta) - \theta \cos(\theta)); \ 0 \leq \theta \leq \pi \).

5. Find the length of the curve \( y = \frac{1}{3}(x^2 + 2)^{3/2}; \ 0 \leq x \leq 1 \).

6. Find the length of the curve \( y = \frac{x^3}{6} + \frac{1}{2x}; \ 1 \leq x \leq 2 \).

7. Find the arclength function for the curve \( y = 2x^{2/3} \) with starting point \( P_0(1,2) \).

8. Find the length of the curve \( y = \frac{x^4}{4} + \frac{1}{8x^2}; \ 1 \leq x \leq 3 \).

9. Find the length of the curve \( y = \ln(\sin(x)); \ \frac{\pi}{6} \leq x \leq \frac{\pi}{3} \).

10. Find the arclength function for the curve \( y = \frac{x^3}{3} + \frac{1}{4x}; \ x > 0 \) with starting point \( P_0(1,7/12) \).

11. Find the area of the surface of revolution obtained by rotating the curve \( y^2 = 4x + 4; \ 0 \leq x \leq 8 \) about the \( x \)-axis.

12. Find the area of the surface of revolution obtained by rotating the curve \( y = \frac{x^2}{4} - \frac{\ln x}{2}; \ 1 \leq x \leq 4 \) about the \( x \)-axis.

13. Find the area of the surface of revolution obtained by rotating the curve \( y = \cos(x); \ 0 \leq x \leq \frac{\pi}{3} \) about the \( x \)-axis.

14. Find the area of the surface of revolution obtained by rotating the curve \( 2y = 3x^{2/3}; \ 1 \leq x \leq 8 \) about the \( x \)-axis.

15. Find the area of the surface of revolution obtained by rotating the curve \( x = \frac{1}{3}(y^2 + 2)^{3/2}; \ 1 \leq y \leq 2 \) about the \( x \)-axis.

16. Find the area of the surface of revolution obtained by rotating the curve \( x = 1 + 2y^2; \ 1 \leq y \leq 2 \) about the \( x \)-axis.

17. Find the area of the surface of revolution obtained by rotating the curve \( y = x^{1/3}; \ 1 \leq y \leq 2 \) about the \( y \)-axis.

18. Find the area of the surface of revolution obtained by rotating the curve \( x = \sqrt{2y - y^2}; \ 0 \leq y \leq 1 \) about the \( y \)-axis.

19. Find the area of the surface of revolution obtained by rotating the curve \( y = 1 - x^2; \ 0 \leq x \leq 1 \) about the \( y \)-axis.

20. Find the area of the surface of revolution obtained by rotating the curve \( x = e^{2y}; \ 0 \leq y \leq 1/2 \) about the \( y \)-axis.

21. Find the area of the surface of revolution obtained by rotating the curve \( x = \frac{1}{2\sqrt{2}}(y^2 - \ln y); \ 1 \leq y \leq 2 \) about the \( y \)-axis.

22. Find the area of the surface of revolution obtained by rotating the curve \( x = t^3, y = t^2; \ 0 \leq t \leq 1 \) about the \( x \)-axis.
23. Find the area of the surface of revolution obtained by rotating the curve \( x = 3t - t^3, y = 3t^2; \quad 0 \leq t \leq 1 \) about the x-axis.

24. Find the area of the surface of revolution obtained by rotating the curve \( x = 3t^2, y = 2t^3; \quad 0 \leq t \leq 5 \) about the y-axis.

25. Find the area of the surface of revolution obtained by rotating the curve \( x = e^t - t, y = 4e^{t/2}; \quad 0 \leq t \leq 1 \) about the y-axis.

26. Find a formula for the following sequences:

   (a) \( \{ \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots \} \)

   (b) \( \{ \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots \} \)

   (c) \( \{ \frac{3}{16}, \frac{4}{25}, \frac{5}{36}, \frac{6}{49}, \ldots \} \)

   (d) \( \{0, 2, 0, 2, \ldots\} \)

27. Determine if the sequence is convergent or divergent.

   (a) \( a_n = \{ arctan(2n) \} \)

   (b) \( a_n = \{ \frac{\pi^n}{3^n} \} \)

   (c) \( a_n = \{ \frac{ln(n^2)}{n} \} \)

   (d) \( a_n = \{ (-1)^n \sin(1/n) \} \)

   (e) \( a_n = \{ \sqrt{n+2} - \sqrt{n} \} \)

   (f) \( a_n = \{ \frac{(-3)^n}{n!} \} \)

   (g) \( \{ \sqrt{2}, \sqrt[3]{2\sqrt{2}}, \sqrt[4]{2\sqrt{2\sqrt{2}}}, \ldots \} \)

28. Determine if the following sequence is convergent \( a_1 = 1, \quad a_{n+1} = 4 - a_n \) for \( n \geq 1 \).

29. Determine if the following sequence is convergent \( a_1 = \sqrt{2}, \quad a_{n+1} = \sqrt{2 + a_n} \) for \( n \geq 1 \).

30. Determine if the following sequence is convergent \( a_1 = 1, \quad a_{n+1} = 3 - \frac{1}{a_n} \) for \( n \geq 1 \).