1. Find the exact value of the function:

$$\arcsin\left(-\frac{\sqrt{2}}{2}\right)$$

2. Evaluate:

$$\lim_{x\to-\infty} 4\sinh x$$

3. Evaluate:

$$\int_2^4 8x\ln x\ dx$$

4. Evaluate:

$$\int_0^1 \frac{1}{\sqrt{16-x^2}}dx$$

5. Compute $\frac{dy}{dx}$ for the function:

$$y = \sinh^2 4x$$

6. Evaluate:

$$\int \frac{9}{\sqrt{64-81x^2}}dx$$

7. Evaluate the limit:

$$\lim_{x\to\infty} x\left(\frac{\pi}{2} - \arctan x\right)$$

8. Find the function $y = f(t)$ passing through the point $(0, 15)$ with the first derivate:

$$\frac{dy}{dt} = \frac{1}{4}t$$

9. Use l'Hopital's rule to evaluate the limit:

$$\lim_{x\to\frac{\pi}{3}} \frac{\cos(x) - \frac{1}{2}}{x - \frac{x}{3}}$$

10. Evaluate:

$$\int \frac{\sinh x}{1+\cosh x}dx$$

11. Find the general solution of the equation:

$$y'(t) - \frac{y}{16} = -11$$

12. Evaluate:

$$\int \frac{1}{x\sqrt{9x^2-6}}dx$$

13. Evaluate the following without use of a calculator:

$$\coth(\ln 6)$$

14. Find the general solution of the equation. Express the solution explicitly as a function of the independent variable:

$$e^{9t}y'(t) = -2$$

15. Evaluate:

$$\int -\operatorname{csch}^2 x\coth x\ dx$$

16. Evaluate:

$$\tan\left(\arccos\left(\frac{1}{2}\right)\right)$$

17. Verify the identity using the definitions of hyperbolic functions:

$$\coth x = \frac{e^{2x}+1}{e^{2x}-1}$$

18. Evaluate:

$$\int e^{2x}x^2\ dx$$

19. Evaluate:

$$\arccos\left(-\frac{\sqrt{3}}{2}\right)$$

20. Compute $\frac{dy}{dx}$ for the function:

$$y = \ln\sinh 7x$$

21. Evaluate or simplify:

$$\arccos\left(\cos\left(-\frac{\pi}{3}\right)\right)$$

22. Find the equation of the line tangent to the curve:

$$2x+\arctan y = y^2-1;\ \text{at the point } P(\frac{-\pi}{8},-1)$$

23. Evaluate the expression without a calculator to a value or to show that the value does not exist. Simplify the answer to the extent possible:

$$\sinh(2\ln 5)$$

24. Find the exact value of the function:

$$\operatorname{arccsc}(-2)$$

25. A conservation organization releases 40 coyotes into a preserve. After 4 years, there are 70 coyotes in the preserve. The preserve has a carrying capacity of 175.

    a) Write a logistic function that models the population, $P(t)$, of coyotoes in the preserve.

    b) Use your answer from (a) to find $\lim\limits_{t\to\infty} P(t)$

26. Compute $\frac{dy}{dx}$ for the function:

    $y = \sinh^2 7x$

27. Evaluate:

    $$\int_0^{\pi/4} \sin^3 4x \; dx$$

28. Find the length of the curve:

    $y = 3x^{\frac{3}{2}}$; from $x = 0$ to $x = \dfrac{5}{9}$

29. Evaluate:

    $$\int \frac{-\csc\theta}{\csc\theta - \cot\theta} d\theta$$

30. Use integration by parts to establish a reduction formula for the integral:

    $$\int x^n e^x dx$$

31. Differentiate:

    $$y = \frac{1}{2}\left[x\sqrt{4-x^4} + 4\arcsin\frac{x}{2}\right]$$

32. Evaluate:

    $$\int_0^{\ln 2} \cosh x \; dx$$

33. Evaluate or simplify:

    $\cos(2\arccos x)$

34. Find the area of the surface generated when the given curve is revolved about the x-axis:

    $y = \dfrac{x^3}{3} + \dfrac{1}{4x}$; from $x = 1$ to $x = 2$

35. Evaluate:

    $$\int \frac{x^2+3}{x\sqrt{x^2-4}} dx$$

36. Evaluate the integral:

    $$\int \frac{2x}{x^2+6x+13} dx$$

37. Find the derivative of y with respect to x:

    $y = 3\arcsin(4x^3)$

38. Determine if the given function y is a solution of the differential equation y''. Assume that C is an arbitrary constant.

    $y = C_1 \sin 5t + C_2 \cos 5t; \quad y''(t) + 25y = 0$

39. Evaluate:

    $$\int \cos^2\theta \sin 2\theta \; d\theta$$

40. Compute $\frac{dy}{dx}$ for the function:

    $y = \sinh 7x$