

EXERCISES

Sections 7.1 and 5.3 – 5.5

Find each integral:

1) $\int \cos q (\tan q + \sec q) dq$

2) $\int (1 - \cot^2 x) dx$

3) $\int \sin^2 x dx$

4) $\int x^2 e^x dx$

5) $\int (\sin 2x - \csc^2 x) dx$

6) $\int e^x \sin x dx$

7) $\int \cos(\ln x) dx$

8) $\int q \cos pq dq$

9) $\int (x^2 - 5x) e^x dx$

10) $\int \frac{8r dr}{4r^2 - 5}$

11) $\int 7 \sin \frac{q}{3} dq$

12) $\int t^3 e^t dt$

13) $\int \frac{1}{\sqrt{x}(1+\sqrt{x})^2} dx$

14) $\int \frac{e^r}{1+e^r} dr$

15) $\int x^{\frac{1}{3}} \sin\left(x^{\frac{4}{3}} - 8\right) dx$

16) $\int (2 + \tan^2 q) dq$

17) $\int \csc x dx$

18) $\int \frac{x}{\sqrt{1-4x^2}} dx$

19) $\int (1.3)^x dx$

20) $\int y^2 \sin y dy$

21) $\int \frac{dx}{e^x + e^{-x}}$

22) 23) $\int \sqrt{\frac{x-1}{x^5}} dx$

23) $\int \frac{1}{\sqrt{e^{2q} - 1}} dq$

24) $\int e^{\sec pt} \sec pt \cdot \tan pt dt$

25) $\int \frac{dx}{x\sqrt{x^4 - 1}}$

Evaluate:

27) $\int_0^4 \sqrt{2x+1} dx$

28) $\int_1^4 \frac{dx}{2\sqrt{x}(1+\sqrt{x})^2}$

29) $\int_0^{p/4} (1 + e^{\tan q}) \sec^2 q dq$

30) $\int_{\ln 4}^{\ln 9} e^{\frac{x}{2}} dx$

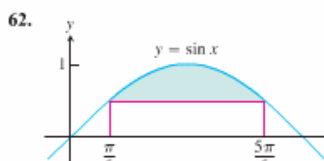
31) $\int_1^2 \frac{2^{\ln x}}{x} dx$

32) $\int_1^4 \frac{\log^2 x}{x} dx$

33) Solve the initial value problem: $\frac{d^2 y}{dx^2} = \sec^2 x, y(0) = 0, y'(0) = 1.$

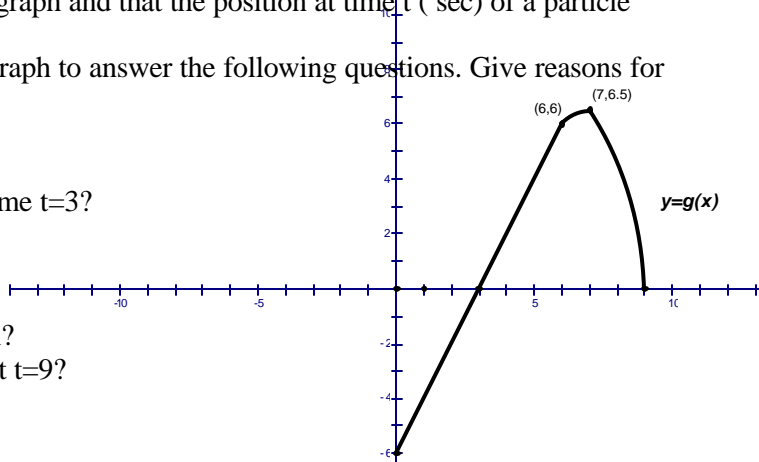
34) Solve the initial value problem: $\frac{ds}{dt} = 12t(3t^2 - 1)^3, s(1) = 3$

35) Find the area of the shaded region.



36) Suppose that g is a differentiable function shown in the graph and that the position at time t (sec) of a particle moving along a coordinate axis is $s = \int_0^t g(x) dx$. Use the graph to answer the following questions. Give reasons for your answers.

- find the velocity at time $t=3$.
- Is the acceleration positive, negative, or zero at time $t=3$?
- What is the particle's position at time $t=3$?
- When does the particle pass through the origin?
- When is the acceleration zero?
- When is the particle moving away from the origin?
- On which side of the origin does the particle lie at $t=9$?



37) Find the area between the x-axis and one arch of $y = \sin kx, k > 0$

38) Find $\lim_{x \rightarrow 0} \frac{1}{x^3} \int_0^x \frac{t^2}{1+t^4} dt$.

39) If $\int_0^x f(t) dt = x \cos p$, find $f(4)$.

40) Find the area between the graph of $f(x) = x^2 - 4x + 3, x \in [0,3]$ and the x-axis.

41) Find the area between the graph of $f(x) = 5 - 5x^{\frac{2}{3}}, x \in [-1,8]$ and the x-axis.

42) Show that $y = x^2 + \int_1^x \frac{1}{t} dt$ solves the initial value problem $\frac{d^2y}{dx^2} = 2 - \frac{1}{x^2}, y'(1) = 3, y(1) = 1$.

43) If $y = \int_{\ln x^2}^0 e^{\cos t} dt$, find $\frac{dy}{dx}$.

Answers:

27) $\frac{26}{3}$; 28) $\frac{1}{6}$; 29) e ; 30) 2; 31) $\frac{1}{\ln 2} (2^{\ln 2} - 1)$; 32) $\ln 4$; 33) $y = -\ln |\cos x| + x = \ln |\sec x| + x$;

34) $s(t) = \frac{1}{2} (3t^2 - 1)^4 - 5$; 35) $\sqrt{3} - \frac{p}{3}$; 37) $\frac{2}{k}$; 38) using l'Hopital $\frac{1}{3}$; 39) 1; 40) $\frac{8}{3}$; 41) 62; 43) $-e^{\cos(\ln x^2)} \cdot \frac{2}{x}$