1. Compute the following:
$$\int \frac{4}{\sqrt{4+25t^2}}\,dt$$
2. Compute the following:
$$\int x^3 \ln x^2 \; dx$$
3. Compute the following:
$$\int \frac{1}{x^2+6x+10}\,dx$$
4. Compute the following:
$$\int \frac{1}{x^3\sqrt{x^2-1}}\,dx$$
for $x > 1$.
5. Compute the following:
$$\int \frac{\sec x}{4-3\tan x}\,dx$$
6. Compute the following:
$$\int 3x\sin(2x) \; dx$$
7. Compute the following:
$$\int e^{\sqrt{x}} \; dx$$
8. Compute the following:
$$\int \frac{dx}{x^2\sqrt{x^2+1}}$$
9. Compute the following:
$$\int \frac{3x+4}{\sqrt{x+1}}\,dx$$
10. Compute the following:
$$\int \cos(\ln x)) \; dx$$
11. Compute the following:
$$\int \sqrt{x(6-x)}\,dx$$
12. Compute the following:
$$\int \frac{1}{3+2\cos x}\,dx$$
13. Compute the following:
$$\int \frac{\sqrt{1-x^2}}{x^4}\,dx$$
14. Compute the following:
$$\int \frac{dx}{\sin(2x)}$$
15. Compute the following:
$$\int \sqrt{2x+3}\,dx$$
16. Compute the following:
$$\int \frac{1}{\sqrt[4]{x}+\sqrt[3]{x}}\,dx$$

17. Compute the following:

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

18. Compute the following:

$$\int \ln(x + \sqrt{x^2 - 1})\, dx$$

19. Compute the following:

$$\int \frac{1}{t^3 + 8}\, dt$$

20. Compute the following:

$$\int \frac{x - 1}{\sqrt{x^2 - 4x + 3}}\, dx$$

21. Compute the following:

$$\int_{\ln(3/4)}^{\ln(4/3)} \frac{e^t}{(1 + e^{2t})^{(3/2)}}\, dt$$

22. Compute the following:

$$\int \frac{\cos x}{2 - \sin x}\, dx$$

23. Compute the following:

$$\int \frac{3x^4 - 11x^3 - 20x^2 + 13x - 51}{(x - 5)(x + 2)}\, dx$$

24. Compute the following:

$$\int \frac{x + 1}{x^2(x - 1)}\, dx$$

25. Compute the following:

$$\int \frac{x}{(16 - x^2)^2}\, dx$$

26. Compute the following:

$$\int \frac{1}{(16 - x^2)^2}\, dx$$

27. Compute the following:

$$\int \frac{-2 - x + 2x^2}{(-1 + x)x^2}\, dx$$

28. Compute the following:

$$\int \frac{dx}{2 + \tan x}$$

29. Compute the following:

$$\int x^3 e^{x^2}\, dx$$

30. Compute the following:

$$\int \sqrt{\sin t} \cos^3 t\, dt$$

31. Compute the following:

$$\int \frac{4x^2 + 54x + 134}{(x - 1)(x^2 + 8x + 15)}\, dx$$

32. Compute the following:

$$\int \sqrt{x} e^{\sqrt{x}}\, dx$$

33. Compute the following:

$$\int \sec^5 x \, dx$$

34. Compute the following:

$$\int \frac{1+\sin(x)}{1+\cos(x)} \, dx$$

35. Compute the following:

$$\int \frac{1}{\sqrt{9-(x-2)^2}} \, dx$$

36. Compute the following:

$$\int \tan^6 x \, dx$$

37. Compute the following:

$$\int \frac{d\theta}{2+\cos\theta}$$

38. Compute the following:

$$\int \frac{\cos\theta}{\sin\theta\cos\theta+\sin\theta} \, d\theta$$

39. Compute the following:

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

40. Compute the following:

$$\int \frac{x^2}{(x^2+8)\sqrt{x^2+8}} \, dx$$

41. Compute the following:

$$\int \sqrt{x}\ln(x) \, dx$$

42. Compute the following:

$$\int \frac{2+9x+5x^2+2x^3}{(3+2x+x^2)^2} \, dx$$

43. Derive the formula for the area of an ellipse. Recall that an ellipse has an equation of the form

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1.$$

44. The area bounded by the x–axis and the function $y=\sin(x)$ for $0 \le x \le \pi$ is rotated about the y–axis. Find the volume.

45. Compute the length of the arc whose equation is $y=x^2$ for $0 \le x \le 2$.

46. Compute the area in the first quadrant bounded by the $x-$axis, $y-$axis, $y=x^2e^x$ and $x=e$.

47. Compute the volume obtained by rotating the region in the plane bounded by the $x-$axis and $y=\sin x$ for $0 \le x \le \pi$ around a) the $x-$axis and b) the $y-$axis. Which gives more volume? Can you explain why?

48. Find the volume of a torus. That is, a circle of radius r rotated about an axis b units from the center of the circle where $b > r$.