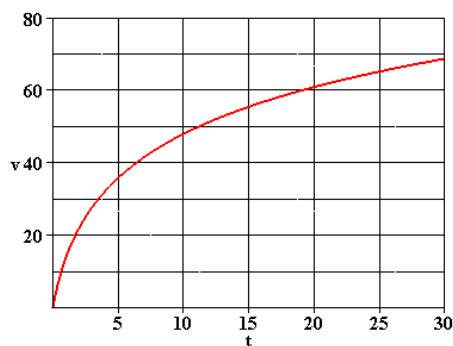


Sample Problems – Section 1

- Find  $f$  if  $f(-2) = 1$  and  $f'(x) = 6x^2 - 4x$
- $\int (8x^3 - 4x^2 + 3x) dx$
- $\int (e^x + \sin x) dx$
- $\int \frac{x^3 - 2x^2 + 4x - 3}{x^3} dx$
- $\int (3x - 4)^5 dx$
- $\int \sin^2 3x \cos 3x dx$
- $\int \frac{dx}{4 + 3x}$
- $\int \frac{dx}{\sqrt{2-x}}$
- $\int (\tan 3x - x) dx$
- If  $f''(x) = 6x - 2$ ,  $f'(0) = 2$ , and  $f(2) = 4$ , find the equation for  $f(x)$ .
- A certain jet needs to be flying  $90 m/sec.$  to take off. If it can accelerate from  $0$  to  $90 m/sec.$  in  $30$  seconds, how long must the runway be?
- The velocity in meters per second of a car over a  $30$  second time period is shown below. Estimate the distance traveled during this period.



- Use the limit definition of the integral to evaluate  $\int_2^5 x^2 dx$ .
- If  $f(x) = \sqrt{x}$ ,  $1 \leq x \leq 4$ , find the left and right sums for  $n = 10$  subintervals.

Section 2

- $\int (2x^3 + 1)^7 x^2 dx$
- $\int \frac{3}{\sqrt{5x-1}} dx$
- $\int \left(1 + \frac{1}{x}\right)^{-3} \left(\frac{1}{x^2}\right) dx$
- $\int \frac{x-2}{(x^2 - 4x + 3)^3} dx$

5.  $\int \frac{(\sqrt{x}+3)^4}{\sqrt{x}} dx$

6.  $\int_2^4 \frac{dx}{9-2x}$

7.  $\int \frac{e^{\frac{3}{x}}}{x^2} dx$

8.  $\int \frac{(e^x+1)^2}{e^x} dx$

9.  $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$

10.  $\int \frac{dx}{x^2 + 6x + 9}$

11.  $\int \frac{2x^2 - 5x - 7}{x-3} dx$

12.  $\int \tan 3x \sec 3x dx$

13.  $\int \frac{\sin 2x}{\sqrt{1-\cos 2x}} dx$

14.  $\int \frac{1+\sin x}{\cos^2 x} dx$

15.  $\int \cos^3 x \sin x dx$

16.  $\int \frac{e^x}{1+e^{2x}} dx$

17.  $\int xe^{-x^2} dx$

18.  $\int x \cos(5x^2) dx$

19.  $\int (2-3x)^3 dx$

20.  $\int \frac{3dx}{\sqrt{1-9x^2}}$

21.  $\int \frac{3x dx}{1+9x^2}$

22.  $\int \frac{3dx}{1+9x^2}$

23.  $\int \frac{x dx}{\sqrt{x+2}}$

24.  $\int \frac{x^2+2}{x} dx$

### Possible Answers- Section 1

1.  $2x^3 - 2x^2 + 25$

2.  $2x^4 - \frac{4}{3}x^3 + \frac{3}{2}x^2 + C$

3.  $e^x - \cos x + C$

4.  $x - 2\ln|x| - \frac{4}{x} + \frac{3}{2x^2} + C$

5.  $\frac{1}{18}(3x-4)^6 + C$

6.  $\frac{1}{9}\sin^3 3x + C$

7.  $\frac{1}{3}\ln|4+3x| + C$

8.  $-2\sqrt{2-x} + C$

9.  $-\frac{1}{3}\ln|\cos 3x| - \frac{1}{2}x^2 + C$

10.  $f(x) = x^3 - x^2 + 2x - 4$

11. 1350 m

12. The exact value is 1529.07 m. The estimate should be reasonably close to this.

13. 39, but did you find it using the definition? 14. 4.515, 4.815

## Answers-Section 2

1.  $\frac{1}{48}(2x^3+1)^8 + C$     2.  $\frac{6}{5}\sqrt{5x-1} + C$     3.  $\frac{1}{2\left(1+\frac{1}{x}\right)^2} + C$
4.  $-\frac{1}{4(x^2-4x+3)^2} + C$     5.  $\frac{2}{5}(\sqrt{x}+3)^5 + C$     6. .8047    7.  $-\frac{1}{3}e^{\frac{3}{x}} + C$
8.  $e^x + 2x - e^{-x} + C$     9.  $\ln(e^x + e^{-x}) + C$     10.  $-\frac{1}{x+3} + C$
11.  $x^2 + x - 4\ln|x-3| + C$     12.  $\frac{1}{3}\sec(3x) + C$     13.  $\sqrt{1-\cos 2x} + C$     14.  $\tan x + \sec x + C$
15.  $-\frac{1}{4}\cos^4 x + C$     16.  $\tan^{-1}(e^x) + C$     17.  $-\frac{1}{2}e^{-x^2} + C$
18.  $\frac{1}{10}\sin(5x^2) + C$     19.  $-\frac{1}{12}(2-3x)^4 + C$     20.  $\sin^{-1}(3x) + C$
21.  $\frac{1}{6}\ln(1+9x^2)$     22.  $\tan^{-1}(3x)$     23.  $\frac{2}{3}(x+2)^{3/2} - 4\sqrt{x+2} + C$     24.  $\frac{1}{2}x^2 + 2\ln|x| + C$