

Compute each of the following antiderivatives

1.  $\int x^2 dx$

6.  $\int ab^2x^3 db$

11.  $\int (-10t + v_0) dt$

2.  $\int (x^5 - 2x^4 + 3) dx$

7.  $\int 1 dx$

12.  $\int \left( \frac{1}{m^2} - \sqrt{m} \right) dm$

3.  $\int \sqrt{y} dy$

8.  $\int \sin \theta d\theta$

13.  $\int \left( -\frac{3}{\sqrt{y}} - \sqrt{y} + 2xy \right) dx$

4.  $\int ab^2x^3 dx$

9.  $\int \cos \alpha d\alpha$

14.  $\int \left( -\frac{3}{\sqrt{y}} - \sqrt{y} + 2xy \right) dy$

5.  $\int ab^2x^3 da$

10.  $\int -10 dt$

15.  $\int (\sin^2 \theta + \cos^2 \theta) d\theta$

16. Find a function  $f$  with the following properties:  $f'(x) = x^2 - 6x + 1$  and  $f(0) = -2$ .

17. Find a function  $f$  with the following properties:  $f'(x) = 6x^2 + 10x - 2$  and  $f(2) = 27$ .

18. Find a function  $f$  with the following properties:  $f'(x) = \frac{1}{x^3}$  and  $f(-1) = 3$ .

19. Find a function  $f$  with the following properties:  $f'(x) = \sin x$  and  $f(\pi) = -2$ .

20. The following problem is an application to physics, where things are very often functions of time, denoted by  $t$ . So use  $t$  instead of  $x$ .

a) We know the following about  $f''$ : it is a constant, with value  $a$ . Find  $f'$  if we also know that  $f'(0) = v_0$

b) Find  $f$  if we also know that  $f(0) = s_0$

## Answers

- 1.)  $\frac{x^3}{3} + C$     2.)  $\frac{1}{6}x^6 - \frac{2}{5}x^5 + 3x + C$     3.)  $\frac{2}{3}y^{3/2} + C$     4.)  $\frac{1}{4}ab^2x^4 + C$     5.)  $\frac{1}{2}a^2b^2x^3 + C$
- 6.)  $\frac{1}{3}ab^3x^3 + C$     7.)  $x + C$     8.)  $-\cos \theta + C$     9.)  $\sin \alpha + C$     10.)  $-10t + C$     11.)  $-5t^2 + tv_0 + C$
- 12.)  $-\frac{1}{m} - \frac{2}{3}m\sqrt{m} + C$     13.)  $-\frac{3}{\sqrt{y}}x - \sqrt{y}x + x^2y + C$     14.)  $-6\sqrt{y} - \frac{2}{3}y\sqrt{y} + xy^2 + C$     15.)  $\theta + C$
- 16.)  $f(x) = \frac{1}{3}x^3 - 3x^2 + x - 2$     17.)  $f(x) = 5x^2 - 2x + 2x^3 - 5$     18.)  $f(x) = -\frac{1}{2x^2} + \frac{3}{2}$
- 19.)  $f(x) = -\cos x - 3$     20.) a)  $f'(t) = at + v_0$     b)  $f(t) = \frac{a}{2}t^2 + v_0t + s_0$

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