

Compute each of the following antiderivatives

1. $\int x^2 dx$

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

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

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

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

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

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. $f(x) = -\frac{1}{2x^2} + \frac{7}{2}$
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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