

CALCULUS
WORKSHEET ON ANTIDERIVATIVES

Find the indefinite integral.

1. $\int(5-x)dx$

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

3. $\int\left(\sqrt{x} + \frac{1}{2\sqrt{x}}\right)dx$

4. $\int(1+3t)t^2 dt$

5. $\int(\theta^2 + \sec^2 \theta)d\theta$

6. $\int \sec y(\tan y - \sec y)dy$

7. Find the equation for y given $\frac{dy}{dx} = 2x - 1$ and $y(1) = 1$.

Solve the differential equation.

8. $h'(t) = 8t^3 + 5$, $h(1) = -4$

9. $f''(x) = 2$, $f'(2) = 5$, $f(2) = 10$

10. $f'(s) = 6s - 8s^3$, $f(2) = 3$

11. $f''(\theta) = \sin \theta$, $f'(0) = 1$, $f(0) = 6$

12. A particle moves along the x -axis at a velocity of $v(t) = \frac{1}{\sqrt{t}}$, $t > 0$. At time $t = 1$, its position is $x = 4$. Find the acceleration and position functions for the particle.

13. A particle, initially at rest, moves along the x -axis such that its acceleration at time $t > 0$ is given by $a(t) = \cos t$. At the time $t = 0$, its position is $x = 3$.

Decide if the statements below are TRUE or FALSE. If False, give a reason or a counterexample.

_____ 14. The anti-derivative of an n th-degree polynomial function is an $(n + 1)$ th-degree polynomial.

_____ 15. If $p(x)$ is a polynomial function, then p has exactly one antiderivative whose graph contains the origin.

_____ 16. If $f'(x) = g(x)$, then $\int g(x) dx = f(x) + C$

_____ 17. The antiderivative of $f(x)$ is unique.