Ch. 22 - Board Problems

1. A 10 foot long ladder is leaning against a wall. If the top of the ladder is sliding down the wall at a rate of 5 ft/sec, how fast is the ladder moving along the ground when the bottom of the ladder is 2 ft from the wall?

2. What formula unites the information in this problem?

3. A balloon is inflated at a rate of 10 in^3/min. At the instant when the radius is 5 inches, what rate is the radius increasing?

4. At what rate is the surface area increasing? SA = 4pi*r^2

Ch. 22 - Antiderivatives

Rule 1: If $y = c$, $y' =$ ___

Rule 2: If $y = x$, $y' =$ ___

Ex. 1

If $f(x) = x + 3$, $f'(x) =$ ___
If $f(x) = x - 2$, $f'(x) =$ ___
If $f(x) = x + c$, $f'(x) =$ ___

where $c =$ _____

Therefore, the antiderivative of 1 is $x + c$

or $\int 1\,dx = x + c$ or $\int 1\,dy = y + c$

If $y = f(x) + g(x)$, then $y' = f'(x) + g'(x)$

So $\int [f(x) + g(x)]\,dx =$ _____

Opposite of Power Rule

If $y = x^4$ then $y' =$ _____

In reverse $\int$

Rule: $\int x^n\,dx = \frac{1}{n+1} x^{n+1} + C$

Ex. 2 $\int x^3 dx =$

CHECK

Ex. 3 $\int r^{\frac{1}{3}} dr =$

RULE: $\int C \cdot f(x)\, dx = C \int f(x)\, dx$

Ex. 4 $\int 2r^{\frac{1}{3}} = 2\int r^{\frac{1}{3}} =$

Ex. 5 $\int 3y^4 - 2\sqrt{y}\, dy =$

Ex. 6 Find the equation of a curve which passes through (2, 3) if the slope of the tangent at any point is 3x+2.

$\int (3x+2)\, dx =$

Ex. 7

Find the curve for which y" = 2 and which passes through (3, 1) and (-1, 2).

$$y' = \int 2\,dx$$

$$y = \int$$

$$=$$

Ex. 8 Find the curve for which y" = 6 and which has a critical point at (1, 4).

$$y'' = 6$$

$$y' = \int 6\,dx$$

22B

Evaluate the following integrals. Check the first three problems by differentiation.

1. $\int 3dy$

2. $\int p^8 dp$

3. $\int \left(\frac{1}{2}x^2 - 4x\right)dx$

4. $\int \left(-2w^3 - \frac{1}{4}w^2 + 4\right)dw$

5. $\int \left(2\sqrt{r} - 5\right)dr$

6. $\int y^3(2y^4+y)dy$

7. $\int \frac{ds}{3s^3}$

8. $\int r^{-\frac{1}{3}}\left(r^3+2r^{\frac{1}{3}}-3\right)dr$

9. Given that $y'' = 6x - x^2$, find y (in terms of x) so as to satisfy the conditions that when $x = 1$, $y = 1$ and $y' = -2$.

10. Find y given that $y'' = -12 + x$; $y' = 60$ and $y = 0$ when $x = 0$.