Differentiation Review

Lesson Problems

$y = x^3 + 0$

$' = 3x^2$

2) $y = x^4 + x^2 + x$

$y' = 4x^3 + 2x + 1$

3) $y = x^7 - x^3 +$

$y' = 7x^6 - 3$

$y = x^3 + 12$

$y' = 3x^2$

5) $y = x^4 + x^2 + x - 7$

$y' = 4x^3 + 2x + 1$

6) $y = x^7 - x^3 +$

$y' = 7x^6 - 3$

$y = 4x^3 + 6$

$y' = 12x^2$

8) $y = 3x^4 + 5x^2 + 2x + 8$

$y' = 12x^3 + 10x + 2$

9) $y = 5x^7 - 4x^3 + 8$

$y' = 35x^6 - 12x$

Integration
Or
Antidifferentiation

Integration is the inverse operation of differentiation

Notation:

$$A_x[D_x(f(x))] \text{ or } \int f(x)\,dx$$

Power Rule

$$\int x^r \, dx = \frac{x^{r+1}}{r+1} + c$$

provided that r is rational and does not equal -1.

Linearity of Indefinite Integrals

$$\int k \, f(x) \, dx = k \int f(x) \, dx$$

$$\int (f(x) \pm g(x)) \, dx = \int f(x) \, dx \pm \int g(x) \, dx$$

Other Rules

$$\int dx = \int 1 \, dx = x + c$$

$$\int \sin x \, dx = -\cos x + c$$

$$\int \cos x \, dx = \sin x + c$$

Integration (A)

Lesson Problems

1) $\int dy = \int (4x^3 + 2x^2)\,dx$

$y = x^4 + \frac{2}{3}x^3 + C$

2) $\int dy = \int (3x^2 + 4x + 8)\,dx$

$y = x^3 + 2x^2 + 8x + C$

3) $\int dy = \int (x^6 - x^5 + x^2 - 2)\,dx$

$y = \frac{1}{7}x^7 - \frac{1}{6}x^6 + \frac{1}{3}x^3 - 2x + C$

4) $\int dy = \int (x^{3/2} + x^{-3})\,dx$

$y = \frac{2}{5}x^{5/2} - \frac{1}{2}x^{-2} + C$

5) $\int dy = \int (5\sin x)\,dx$

$y = -5\cos x + c$

6) $\int dy = \int (8\cos x)\,dx$

$y = 8\sin x + c$

7) $\int dy = \int x^4 (5 - x^2)\,dx$

$\int dy = \int 5x^4 - x^6\,dx$

$y = x^5 - \frac{1}{7}x^7 + c$

8) $\int dy = \int \left(\frac{1}{x^3}\right) dx$

$\int dy = \int x^{-3}\,dx$

$y = \frac{-1}{2}x^{-2} + c$

9) $\int dy = \int (5u^{4/3})\,du$

$y = \frac{15}{7}u^{7/3} + C$

$5 \div \frac{7}{3}$

$5 \cdot \frac{3}{7}$

10) $\int dy = \int \left(\frac{3}{\sqrt{x}}\right) dx$

$\int dy = \int 3x^{-1/2}\,dx$

$y = 6x^{1/2} + C$

11) $\int dy = \int \left(\frac{2 + x^2 - 8x^3}{x^2}\right) dx$

$\int dy = \int (2x^{-2} + 1 - 8x)\,dx$

$y = -2x^{-1} + x - 4x^2 + C$

12) $\int dy = \int (x^2 + 4x)^2\,dx$

$\int dy = \int (x^4 + 8x^3 + 16x^2)\,dx$

$y = \frac{1}{5}x^5 + 2x^4 + \frac{16}{3}x^3 + C$