Math 220 - Calculus f. Business and Management - Worksheet 34

Worksheet 34 - Mixed Integration Methods

1: $\int (3x^2 - 8x)(x^3 - 4x^2 + 2)^{12}\, dx$

2: $\int \left(\frac{3}{\sqrt[4]{x}} + e^x\right) dx$

3: $\int (x + 1)e^{3x^2 + 6x}\, dx$

4: $\int x^3 \ln x\, dx$

5: $\int \sqrt{7t - 5}\, dt$

6: $\int \frac{1 + 6q^3}{q}\, dx$

7: $\int \frac{\sqrt[3]{x}}{\sqrt[5]{x}}\, dx$

Again this one seems tricky, but observe that we can combine the top and bottom of the fraction. Remember that when you divide, you subtract the exponents. We do this below:

$$\int \frac{\sqrt[3]{x}}{\sqrt[5]{x}}\, dx = \int x^{1/3} \cdot x^{-1/5}\, dx = \int x^{(5/15 - 3/15)}\, dx = \int x^{2/15}\, dx = \frac{15}{17} x^{17/15} + C$$

8: $\int \frac{2p^3 + 3}{(p^4 + 6p)^5}\, dx$

We will set $u = p^4 + 6p$ *so that* $\frac{du}{dp} = 4p^3 + 6 = 2(2p^3 + 3)$. *Thus,* $\frac{1}{2} du = (2p^3 + 3)\, dp$

This will work nicely to substitute in now:

$$\int \frac{2p^3 + 3}{(p^4 + 6p)^5}\, dp = \frac{1}{2} \int u^{-5}\, du = \frac{1}{2} \cdot \left(\frac{-1}{4}\right) \cdot u^{-4} + C = \frac{-1}{8}(p^4 + 6p)^{-4} + C = \frac{-1}{8(p^4 + 6p)^4} + C$$

9: $\int (4x - 6)e^{5x}\, dx$

10: $\int \frac{4x}{2x^2 - 1}\, dx$

11: $\int \frac{x^2 + \sqrt{x}}{3x}\, dx$

12: $\int \frac{\ln(3x + 2)}{3x + 2}\, dx$