Homework 11

1. Find the indefinite integral. (Use *C* for the constant of integration.)

$$\int \frac{x^2}{x-3}\,dx$$

2. Find the indefinite integral. (Use *C* for the constant of integration.)

$$\int \frac{36}{e^{-x}+1}\,dx$$

3. Find the indefinite integral using integration by parts with the given choices of *u* and *dv*. (Use *C* for the constant of integration.)

$$\int x \cdot cos4x\ \ dx$$

$$u = x, dv = cos4x\ \ dx$$

4. Find the integral. (Use *C* for the constant of integration.)

$$\int x^6 \ln x\ \ dx$$

Sol：

1.Find the indefinite integral. (Remember to use absolute values where appropriate. Use *C* for the constant of integration.)

$$\int \frac{x^2}{x-3}dx = \int (x+3)\,dx + \int \frac{9}{x-3}dx$$

$$(\text{let } u = x-3, du = dx)$$

$$= \frac{1}{2}x^2 + 3x + 9\ln|x-3| + C$$

2.Find the indefinite integral. (Use *C* for the constant of integration.)

$$\int \frac{36}{e^{-x}+1}dx = 36\int \left(\frac{1}{e^{-x}+1}\right)\left(\frac{e^x}{e^x}\right)dx$$

$$= 36\int (\frac{e^x}{1+e^x})dx$$

$$(\text{let } u = 1+e^x, du = e^x dx)$$

$$= 36\ln(1+e^x) + C$$

3.Find the indefinite integral using integration by parts with the given choices of *u* and *dv*. (Use *C* for the constant of integration.)

$$\int x \cdot cos4x \ \ dx$$

$$u = x, dv = cos4x \ \ dx$$

$$du = dx, v = \int cos4x \ \ dx = \frac{1}{4}sin4x$$

$$\int x \cdot cos4x \ \ dx = uv - \int v\,du$$

$$= x\left(\frac{1}{4}sin4x\right) - \int \frac{1}{4}sin4x\,dx$$

$$= \frac{x}{4}sin4x + \frac{1}{16}cos4x + C$$

4.Find the integral. (Use *C* for the constant of integration.)

$$\int x^6 \ln x \ \ dx$$

$$dv = x^6 dx \ \ , v = \int x^6\,dx = \frac{x^7}{7}$$

$$u = \ln x \ \ , du = \frac{1}{x}dx$$

$$\int x^6 \ln x \quad dx = \frac{x^7}{7}\ln x - \int \frac{x^7}{7}\left(\frac{1}{x}\right)dx$$

$$= \frac{x^7}{7}\ln x - \frac{1}{7}\int x^6\,dx$$

$$= \frac{x^7}{7}\ln x - \frac{1}{49}x^7 + C$$

$$= \frac{x^7}{49}(7\ln x - 1) + \mathrm{C}$$