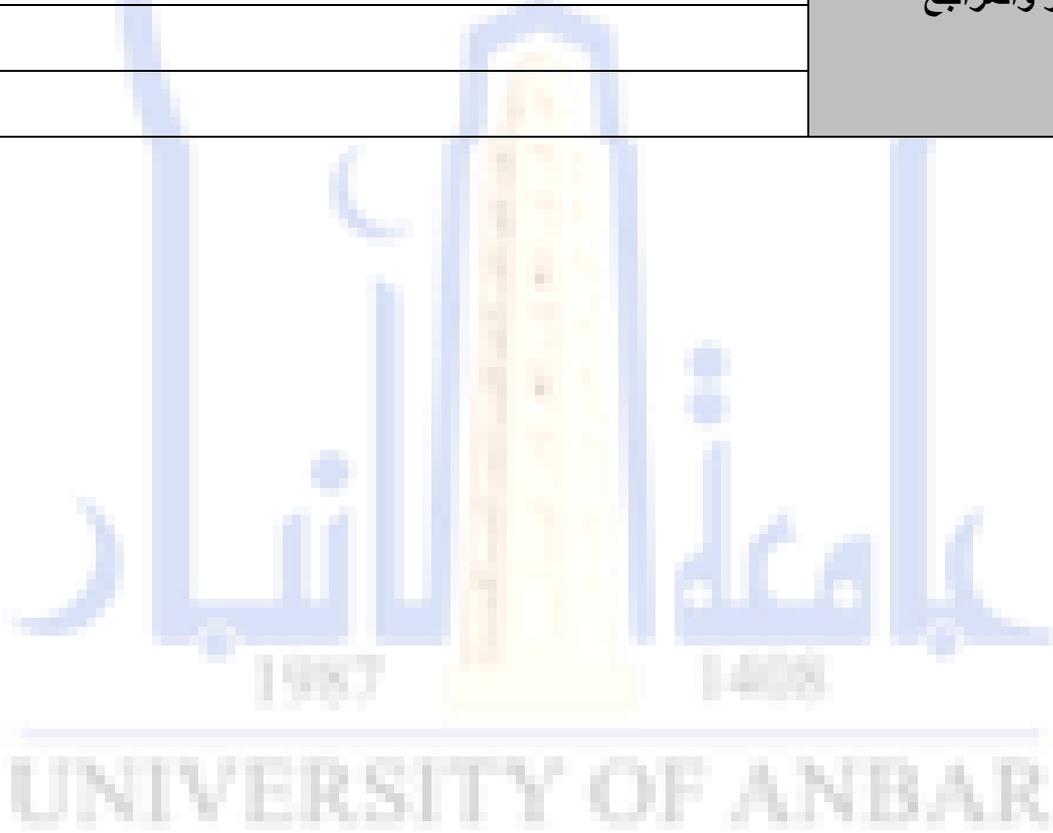


العلوم	الكلية
الجيولوجي	القسم
Mathematics	المادة باللغة الانجليزية
الرياضيات	المادة باللغة العربية
الأولى	المرحلة الدراسية
عمر محمد فخري	اسم التدريسي
Rules of integration	عنوان المحاضرة باللغة الانجليزية
قواعد التكامل	عنوان المحاضرة باللغة العربية
2	رقم المحاضرة
Thomas GB, Finney RL, Weir MD, Giordano FR. Thomas' calculus. Reading: Addison-Wesley; 2003.	المصادر والمراجع



* تكامل الجذور

I. عامل مشترك

II. مربع كامل

III. نتخلص منه الجذر (الداخل / الخارج)

$$\Rightarrow \int_1^8 \frac{X}{\sqrt{X^3 + 8X^2}} dx$$

$$\int_1^8 \frac{X}{\sqrt{X^2(X+8)}} dx \rightarrow \int_1^8 \frac{\cancel{X}}{\cancel{X} \sqrt{(X+8)}} dx$$

$$\int_1^8 (X+8)^{-1/2} dx = \left[2 \cdot (X+8)^{1/2} \right]_1^8 = \left[2\sqrt{X+8} \right]_1^8 = 2$$

$$\Rightarrow \int_{-1}^1 \sqrt[3]{3X^3 - 2X^5} dx$$

$$\int_{-1}^1 \sqrt[3]{X^3(3-2X^2)} dx \rightarrow \int_{-1}^1 X(3-2X^2)^{1/3} dx$$

-4X = د.م.ع

$$\frac{1}{-4} \int_{-1}^1 (-4X)(3-2X^2)^{1/3} dx$$

$$= \frac{1}{-4} \left[\frac{3}{4} \cdot (3-2X^2)^{4/3} \right]_{-1}^1 = \left[\frac{-3}{16} \sqrt[3]{(3-2X^2)^4} \right]_{-1}^1 = 0$$



$$\Rightarrow \int \sqrt[3]{X^2 + 4X + 4} dx$$

$$\int \sqrt[3]{(X+2)^2} dx \rightarrow \int \underline{(X+2)}^{\frac{2}{3}} dx$$

$1 = u \rightarrow u^{\frac{2}{3}}$

$$= \frac{3}{5} \cdot (X+2)^{\frac{5}{3}} + C = \frac{3}{5} \sqrt[3]{(X+2)^5} + C$$

$$\Rightarrow \int \frac{X}{\sqrt[3]{X^4 - 4X^2 + 4}} dx$$

$$\int \frac{X}{\sqrt[3]{(X^2-2)^2}} dx \rightarrow \int X (X^2-2)^{-\frac{2}{3}} dx$$

$2X = u \rightarrow u^{-\frac{2}{3}}$

$$\frac{1}{2} \int \underline{2X} (X^2-2)^{-\frac{2}{3}} = \frac{3}{2} \sqrt[3]{X^2-2} + C$$

$$\Rightarrow \int_4^8 X \sqrt{X^2-15} dx$$

$$\int_4^8 X (X^2-15)^{\frac{1}{2}} dx$$

$2X = u \rightarrow u^{\frac{1}{2}}$

$$\frac{1}{2} \int_4^8 2X (X^2-15)^{\frac{1}{2}} = \left[\frac{1}{3} \sqrt{(X^2-15)^3} \right]_4^8 = 114$$



$$\Rightarrow \int \frac{\sqrt{\sqrt{x}-x}}{\sqrt[4]{x^3}} dx$$

$$\int \frac{\sqrt{\sqrt{x}(1-\sqrt{x})}}{\sqrt[4]{x^3}} dx \rightarrow \int \frac{\sqrt{\sqrt{x}} \cdot \sqrt{(1-\sqrt{x})}}{\sqrt[4]{x^3}} dx$$

$$\int \frac{\sqrt[4]{x} \cdot \sqrt{(1-\sqrt{x})}}{\sqrt[4]{x^3}} dx \rightarrow \int \frac{(1-\sqrt{x})^{\frac{1}{2}}}{x^{-\frac{1}{4}} \cdot x^{\frac{3}{4}}} dx$$

$$\int \frac{(1-\sqrt{x})^{\frac{1}{2}}}{\sqrt{x}} dx \quad -\frac{1}{2\sqrt{x}} \text{ is a constant}$$

$$-2 \int \frac{(1-\sqrt{x})^{\frac{1}{2}}}{-2\sqrt{x}} dx = -2 \cdot \frac{2}{3} (1-\sqrt{x})^{\frac{3}{2}} + C$$

$$= -\frac{4}{3} \sqrt{(1-\sqrt{x})^3} + C$$



$$\Rightarrow \int (4x+6)\sqrt{2x+3} dx \quad * \text{توسيع الزمرة الى اولى}$$

$$\int 2(2x+3)(2x+3)^{\frac{1}{2}} dx \rightarrow \int 2(2x+3)^{\frac{3}{2}} dx$$

$$= \frac{2}{5} (2x+3)^{\frac{5}{2}} + c = \frac{2}{5} \sqrt{(2x+3)^5} + c$$

$$\Rightarrow \int (x^3+x)\sqrt{x^2+1} dx$$

$$\int x(x^2+1)(x^2+1)^{\frac{1}{2}} dx \rightarrow \int x(x^2+1)^{\frac{3}{2}} dx \quad \begin{matrix} 2x = \text{توسيع} \\ \uparrow \end{matrix}$$

$$\frac{1}{2} \int 2x(x^2+1)^{\frac{3}{2}} dx = \frac{1}{2} \cdot \frac{2}{5} \cdot (x^2+1)^{\frac{5}{2}} + c$$

$$= \frac{1}{5} \sqrt{(x^2+1)^5} + c$$

$$\Rightarrow \int \frac{3x-6}{\sqrt[3]{x-2}} dx$$

$$\int 3(x-2)(x-2)^{-\frac{1}{3}} dx \rightarrow 3 \int (x-2)^{\frac{2}{3}} dx$$

$$= 3 \left[\frac{3}{5} (x-2)^{\frac{5}{3}} \right] + c$$

$$= \frac{9}{5} \sqrt[3]{(x-2)^5} + c$$



$$\Rightarrow \int \frac{x-3}{(2x-6)^3} dx$$

$$\int (x-3)(2)^{-3}(x-3)^{-3} dx$$

$$\frac{1}{8} \int (x-3)^{-2} dx = \frac{1}{8} \cdot (-1) \cdot (x-3)^{-1} + c$$

$$= \frac{-1}{8(x-3)} + c$$

$$\Rightarrow \int x^4 \left(\frac{1}{x} + 5\right)^4 dx$$

$$\int \left[x \left(\frac{1}{x} + 5\right) \right]^4 dx \rightarrow \frac{1}{5} \int 5 \cdot (1+5x)^4 dx$$

5 = c.s.f

$$= \frac{1}{5} \cdot \frac{(1+5x)^5}{5} + c$$

$$= \frac{1}{25} (1+5x)^5 + c$$



$$\Rightarrow \int_0^{\frac{1}{3}} x^4 \left(\frac{1}{x} + 3\right)^4 dx$$

$$\int_0^{\frac{1}{3}} \left[x \left(\frac{1}{x} + 3\right) \right]^4 dx \rightarrow \left(\frac{1}{3}\right) \int_0^{\frac{1}{3}} 3(1+3x)^4 dx \quad \left. \begin{array}{l} 3 = \text{N.S.P} \\ \uparrow \end{array} \right\}$$

$$= \left[\frac{1}{3} \cdot \frac{(1+3x)^5}{5} \right]_0^{\frac{1}{3}} = \left[\frac{(1+3x)^5}{15} \right]_0^{\frac{1}{3}}$$

$$= \frac{31}{15}$$

$$\Rightarrow \int \frac{(3 - \sqrt{5x})^7}{\sqrt{7x}} dx$$

$$\int \frac{(3 - \sqrt{5}\sqrt{x})^7}{\sqrt{7}\sqrt{x}} dx \rightarrow \frac{1}{\sqrt{7}} \int \frac{(3 - \sqrt{5}\sqrt{x})^7}{\sqrt{x}} dx$$

$\frac{-\sqrt{5}}{2\sqrt{x}} = \text{N.S.P}$

$$\frac{1}{\sqrt{7}} \cdot \left(\frac{-2}{\sqrt{5}}\right) \int \frac{\sqrt{5}}{-2} \cdot \frac{(3 - \sqrt{5}\sqrt{x})^7}{\sqrt{x}} dx$$

$$= \frac{-2}{\sqrt{35}} \left[\frac{(3 - \sqrt{5x})^8}{\frac{8}{4}} \right] + C$$

$$= \frac{-1}{4\sqrt{35}} \cdot (3 - \sqrt{5x})^8 + C$$