Clase 5

Clase   29/10/2020

Plan

- Ejercicios
- Tabla de integrales trigonométricas

- Evaluar las integrales

$$\int \frac{x^2}{\sqrt[3]{1+2x}}\, dx$$

$$u^3 = 1+2x \qquad \therefore x = \frac{u^3-1}{2} \qquad dx = \frac{3u^2}{2}\, du$$

$$\int \frac{\left(\frac{u^3-1}{2}\right)^2}{\sqrt[3]{u^3}} \cdot \frac{3u^2}{2}\, du$$

$$\int \frac{\left(\frac{u^3}{2}-\frac{1}{2}\right)^2}{u} \cdot \frac{3u^2}{2}\, du \qquad \therefore \int \frac{\frac{(u^3-1)^2}{4}}{u} \cdot \frac{3u^2}{2}\, du$$

$$\int \frac{\left(\frac{u^6 - 2u^3 + 1}{4}\right)}{u} \cdot \frac{3u^2}{2}\, du$$

$$\int \frac{u^6 - 2u^3 + 1}{4u} \cdot \frac{3u^2}{2}\, du$$

$$\frac{3u^2 (u^6 - 2u^3 + 1)}{8u} = \frac{3u(u^6 - 2u^3 + 1)}{8}$$

$$\frac{3(1+2x)\left((1+2x)^6 - 2(1+2x)^3 + 1\right)}{8} + C$$

$$\int \frac{4e^{3x}}{1+e^{2x}} = \int \frac{4e^{2x}}{1+e^{2x}} \cdot e^x$$

$u = e^x \qquad u^2 = (e^x)^2$

$u^2 = e^{2x}$

$du = e^x dx$

$$\int \frac{4e^{2x}}{1+u^2} \cdot du$$

$$\int \frac{4u^2}{1+u^2} \, du = 4 \int \frac{u^2}{1+u^2}$$

$$4 \int -\frac{1}{1+u^2} + 1 \, du$$

$$4 \left(\arctan(u) + u \right) + C$$
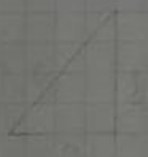
$$4 \left(-\arctan(e^x) + e^x \right) + C$$

5/11/2020

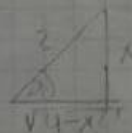Plan

- Repaso
- Integrales trigonometricas
- Tarea

Integrales trigonometricas

- No se desarrollan de manera directa
- No es un cambio de variable
- No es por partes

$$\int \sqrt{4-x^2} \, dx$$

$c^2 = 4$

$b^2 = x^2$

$h = x$

$a = \sqrt{4-x^2}$

$\sqrt{4-x^2}$

- Encontrando la relacion entre c y a

$$\int \frac{x^3}{\sqrt{x^2+1}^3}\, dx \qquad v^2 = x^2+1 \ \therefore\ x = \sqrt{v^2-1} \qquad dx = \frac{x}{\sqrt{v^2-1}}\, dv$$

$$\int \frac{\left(\sqrt{v^2-1}\right)^3}{v}\cdot\frac{v}{\sqrt{v^2-1}}\, dv$$

$$\int \frac{(v^2-1)^{3/2}}{v}\cdot\frac{v}{(v^2-1)^{1/2}}\, dv$$

$$\int \frac{(v^2-1)^{3/2}}{(v^2-1)^{1/2}}\, dv$$

$$\int (v^2-1)^{3/2-1/2}\, dv$$

$$\int (v^2-1)\, dv = (x^2+1)^2 - 1 + C$$

$$\left(\int \frac{4e^{3x}}{1+2e^{x}}\right) \qquad \int x\sqrt{1+x}\, dx$$

$$U = 1+x \qquad x = u-1 \qquad dx = 1\, du$$

$$\int (u-1)(\sqrt{u})\, du$$

$$\int u(\sqrt{u}) - \sqrt{u}\, du$$

$$\int u(u^{1/2} - u^{1/2})\, du$$

$$\int u^{3/2} - u^{1/2}\, du$$

$$\frac{u^{5/2}}{5/2} - \frac{u^{3/2}}{3/2}\, du = \frac{2}{5}u^{5/2} - \frac{2}{3}u^{3/2}$$

$$\frac{2}{5}(1+x)^{5/2} - \frac{2}{3}(1+x)^{3/2}$$

$$\int \frac{4e^{3x}}{1+e^{2x}} = \int \frac{4e^{2x}}{1+e^{2x}} \cdot e^x$$

$$v = e^x \qquad v^2 = (e^x)^2$$

$$v^2 = e^{2x}$$

$$dv = e^x \, dx$$

$$\int \frac{4e^{2x}}{1+v^2} \cdot dv$$

$$\int \frac{4v^2}{1+v^2} \, dv = 4 \int \frac{v^2}{1+v^2}$$

$$4 \int -\frac{1}{1+v^2} + 1 \, dv$$

$$4 \left(arctan(v) + v \right) + C$$

$$4 \left(-arctan(e^x) + e^x \right) + C$$