$$y = \operatorname{arcsec}(\overset{u}{x^2+2x-3})$$

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

---

$$\frac{d}{dx} \operatorname{arc\,cot} u = \frac{-u'}{1+u^2}$$

---

$$y = \operatorname{arccot} \sqrt{x}$$

$$\frac{dy}{dx} = \frac{-\frac{1}{2\sqrt{x}}}{1+x}$$

---

تحفظ

$$\int \frac{u'}{\sqrt{1-u^2}} = \arcsin u + c$$

$$\int \frac{u'}{1+u^2} = \arctan u + c$$

$$\int \frac{u'}{u\sqrt{u^2-1}} = \operatorname{arcsec} u + c$$

Ex:

$$\int \frac{1}{\sqrt{1-25x^2}}\,dx$$

$$= \frac{1}{5}\int \frac{5}{\sqrt{1-(5x)^2}}\,dx$$

$$= \frac{1}{5}\arcsin(5x) + C$$

Ex:

$$\int \frac{x}{\sqrt{1-25x^2}}\,dx$$

$$= \frac{1}{-50}\int (1-25x^2)^{-\frac{1}{2}}(-50x)\,dx$$

$$= -\frac{1}{50}\,\frac{(1-25x^2)^{1/2}}{1/2} + C$$

$$= \frac{1}{25}\sqrt{1-25x^2} + C$$

Exer!

$$\int \frac{3}{\sqrt{1-4x^2}}\,dx, \quad \int \frac{5}{\sqrt{1-9x^2}}\,dx$$

$$\int \frac{1}{x\sqrt{16x^2-1}}\,dx \qquad \int (16x^2-1)^{-\frac{1}{2}} \frac{1}{x}\,dx \quad \times$$

$$= \frac{4}{4}\int \frac{4}{4x\sqrt{(4x)^2-1}}\,dx$$

$$= \int \frac{4}{(4x)\sqrt{(4x)^2-1}}\,dx = \operatorname{arcsec}(4x)+c$$

---

Ex:

$$\int \frac{3x}{x^4+1}\,dx$$

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

---

Ex:

$$\int \frac{1}{x\sqrt{4x^2-9}}\,dx$$

$$\frac{1}{3}\int \frac{dx}{x\sqrt{\frac{4x^2}{9}-1}} = \frac{1}{3}\cdot\int \frac{\frac{2}{3}\,dx}{\frac{2x}{3}\sqrt{\left(\frac{2}{3}x\right)^2-1}}$$

$$= \frac{1}{3}\operatorname{arcsec}\left(\frac{2}{3}x\right) + c \quad \checkmark$$

انتهت المحاضرة ١١:٠٠
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