

**Syria Math**

تحليل ١

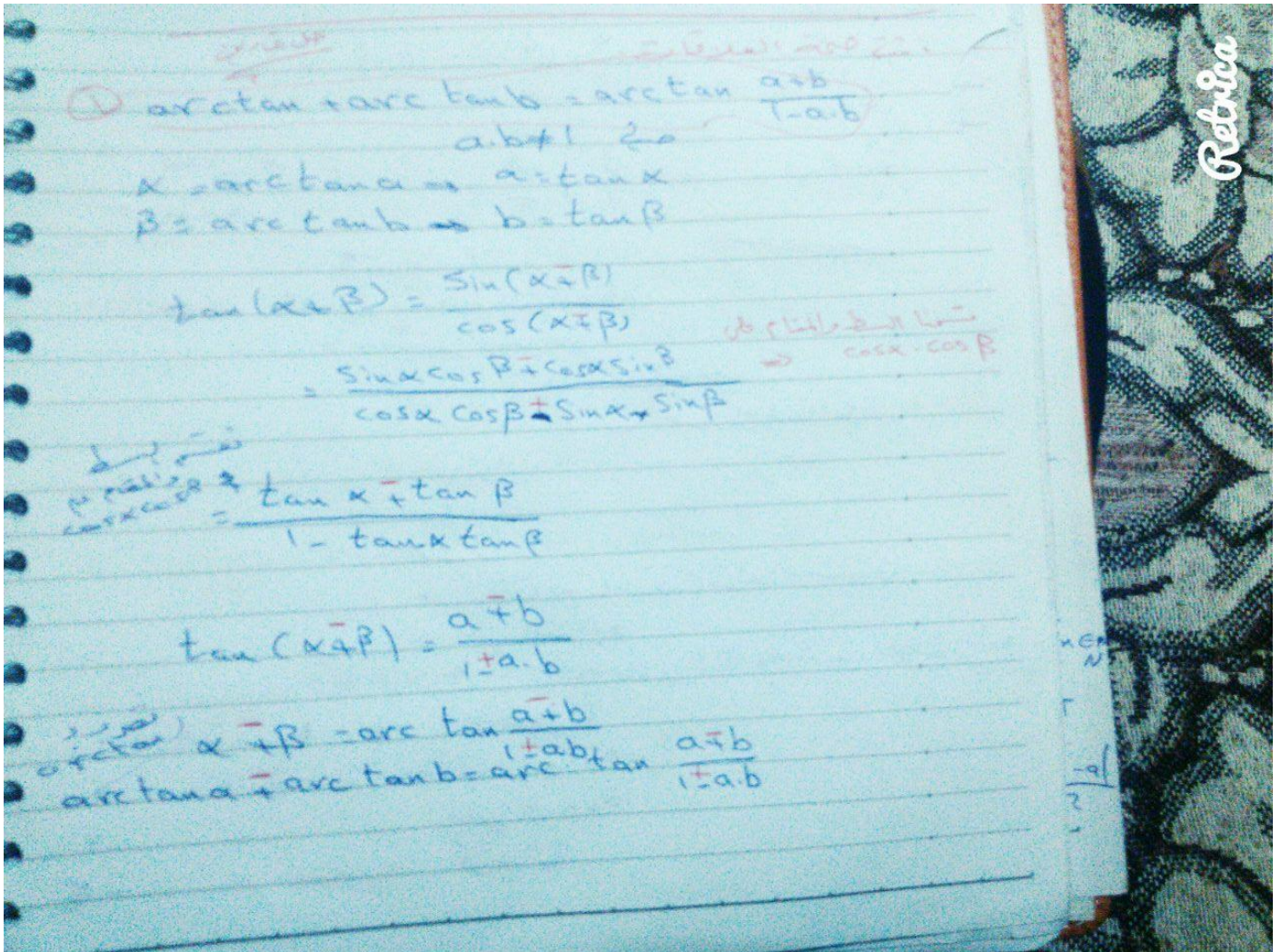


الدكتور : نايف طلي

المحاضرة : الثامنة عشرة "والأخيرة"

Web: [www.syriamath.net](http://www.syriamath.net)

group: Improve our mathematics



Retrica

Syria Math



$$2) \arctan a - \arctan b = \arctan \frac{a-b}{1+a \cdot b}$$

Subject

$$3) \arctan x = \arcsin \frac{x}{\sqrt{1+x^2}} \quad ; x \in \mathbb{R}$$

$$x = \arctan x \Rightarrow x = \tan x$$

$$\sin x = \frac{\sin x}{\sqrt{\cos^2 x + \sin^2 x}} \Rightarrow \text{نقسم بسط المقام بـ } \cos$$

$$= \frac{\tan x}{\sqrt{1+\tan^2 x}} = \frac{x}{\sqrt{1+x^2}}$$

~~$$\arcsin x = \arctan \frac{x}{\sqrt{1-x^2}}$$~~

~~$$x = \arcsin x \Rightarrow x = \sin x$$~~

أيضا

$$\arcsin \frac{x}{\sqrt{1+x^2}} = \arcsin \frac{x}{\sqrt{1+x^2}}$$

$$\arctan x = \arcsin \frac{x}{\sqrt{1+x^2}}$$

$$4) \arcsin x = \arctan \frac{x}{\sqrt{1-x^2}}$$

$$x = \arcsin x = x = \sin x$$

$$\tan x = \frac{\sin x}{\cos x} = \frac{\sin x}{\sqrt{1-\sin^2 x}}$$

$$\tan x = \frac{x}{\sqrt{1-x^2}}$$

أيضا

$$x = \arctan \frac{x}{\sqrt{1-x^2}}$$



Subject

$$\arcsin x = \arctan \frac{x}{\sqrt{1-x^2}}$$

$$(shx + chx)^n = shnx + chnx$$

$$(e^x)^n = e^{nx} \quad shx + chx = e^x$$

السؤال التالي هو:

$$\frac{x^2}{1-x^2}$$

$$\frac{1}{1-x} = 1 + x + x^2 + x^3 + \dots + x^n \quad n=0,1,2,\dots \quad |x| < 1$$

$$\frac{1}{1-x^2} = 1 + x^2 + x^4 + \dots + x^{2n} \quad |x| < 1$$

$$\frac{x^2}{1-x^2} = x^2 + x^4 + x^6 + \dots + x^{2n+2} \quad |x| < 1$$

$$\frac{x^2}{(1-x)^2}$$

$$\left(\frac{1}{1-x}\right)' = \frac{1}{(1-x)^2}$$

$$\frac{1}{(1-x)^2} = 1 + 2x + 3x^2 + \dots + nx^{n-1}$$

$$\frac{x^2}{(1-x)^2} = x^2 + 2x^3 + 3x^4 + \dots + nx^{n+1}$$



Subject

$$\frac{1}{1+x^2}$$

$$\frac{1}{1+x} = 1 - x + x^2 - x^3 + \dots \quad |x| < 1$$

$$\frac{1}{1+x^2} = 1 - x^2 + x^4 - x^6 + \dots \quad |x| < 1$$

$$\frac{1}{1+x^2} = x^2 - x^4 + x^6 - x^8 + \dots \quad |x| < 1$$

$\ln(1+x)$

$$\int \frac{1}{1+x} dx = \ln(1+x)$$

$$\frac{1}{1+x}$$

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots + (-1)^n \frac{x^{n+1}}{n+1}$$

$\arctan x$

$$(\arctan x)' = \frac{1}{1+x^2}$$

$$\int \frac{1}{1+x^2} dx = \arctan x$$

$$\arctan x = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots + (-1)^n \frac{x^{2n+1}}{2n+1}$$

Retrica



Subject

$$\left(\frac{1}{2} \ln \frac{1+x}{1-x}\right)' = \frac{1}{2} \left[ \frac{\left(\frac{1+x}{1-x}\right)'}{\frac{1+x}{1-x}} \right]$$

$$= \frac{1}{2} \frac{1-x - (-1)(1+x)}{(1-x)^2} = \frac{1}{2} \frac{1-x+1+x}{(1-x)(1-x)} = \frac{1}{2} \frac{2}{1-x^2} = \frac{1}{1-x^2}$$

$$\frac{1}{2} \ln \frac{1+x}{1-x} = \int \frac{1}{1-x^2} dx = \frac{1}{2} \ln \frac{1+x}{1-x}$$

$$\frac{1}{2} \ln \frac{1+x}{1-x} = x + \frac{x^3}{3} + \frac{x^5}{5} + \dots + \frac{x^{2n+1}}{2n+1} \dots$$

$$e^{ix} = \cos x + i \sin x$$

$$e^{ix} = 1 + \frac{i}{1!} x - \frac{1}{2!} x^2 - \frac{i}{3!} x^3 + \frac{1}{4!} x^4 + \frac{i}{5!} x^5 - \frac{1}{6!} x^6 + \dots$$

$$= \left(1 - \frac{1}{2!} x^2 + \frac{1}{4!} x^4 - \frac{1}{6!} x^6 + \dots\right) + i \left(\frac{1}{1!} x - \frac{1}{3!} x^3 + \frac{1}{5!} x^5 - \dots\right)$$

$$= \cos x + i \sin x$$