

سنتر فيوتشر

"الشافعي"

Subject: الجبر المختلط Complex Algebra

Chapter: Partial function الجزئية الجزئي

العنوان:

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الكتور طارق سعيد

Partial function

- ١) قادر زن داشته باشد [که در کارهای این طبقه] از قدر
من داشته باشد (نمی توان این فرض ممکن است)
اذا كان المقادير المطلوبة
٢) اذا كان المقادير المطلوبة
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٣) اذا كان المقادير المطلوبة
لهم رسموا فرسانه موافق من
٤) اذا كان المقادير المطلوبة
وغير مكرر

Resolve to Partial fraction

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

$$\frac{2x+1}{(x-2)(x-3)} = \frac{a}{x-2} + \frac{b}{x-3}$$

$$\text{تم تم بعمر النجف } b, a \rightarrow 5$$

$$\underline{x=3}$$

$$b = \frac{(2x+1)}{(x-2)} \Big|_{x=3} = 7$$

$$\therefore f(x) = \frac{-3}{x-2} + \frac{7}{x-3}$$

Resolve

$$\frac{2x^1 + 3}{x^2 - 4}$$

3

$\frac{2c}{x}$ ~~2~~

$$\frac{2+3x}{x(x-2)(x+2)} = \frac{a}{x} + \frac{b}{x-2} + \frac{c}{x+2}$$

$$x=0 \quad a = \frac{2}{-4} = -\frac{1}{2}$$

$$x=2 \quad b = \frac{8}{(2)(4)} = 1$$

$$x=-2 \quad c = \frac{-4}{(-2)(-4)} = \frac{1}{2}$$

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

(e)

Resolve [Factorize to partial fraction

$$\frac{xe^x + 3}{e^{2x} - e^x - 2} \quad \xrightarrow{b}$$

$$\frac{1e^x}{e^x} = y$$

$$\frac{y+3}{y^2 - y - 2} = \frac{y+3}{(y-2)(y+1)}$$

$$\frac{y+3}{(y-2)(y+1)} = \frac{a}{y-2} + \frac{b}{y+1}$$

$$\underline{\underline{y=2}} \quad a = \frac{5}{3}$$

$$\underline{\underline{y=-1}} \quad b = \frac{2}{-3} = -\frac{2}{3}$$

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



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

الآن نقسم

نحو فرق المربعين

$$\begin{array}{r} x+2 \\ \hline x^2 - 2x - 3 \end{array} \overline{) x^3 + 5x - 1} \\ \underline{-} x^3 - 2x^2 - 3x \\ \hline 2x^2 + 8x - 1 \\ \underline{-} 2x^2 - 4x - 6 \\ \hline 12x + 5 \end{array}$$

$\therefore f(x) = (x+2) + \frac{12x+5}{(x^2 - 2x - 3)}$

الجواب

الممكنا

$$= (x+2) + \frac{12x+5}{(x-3)(x+1)}$$

$$= (x+2) + \frac{A}{x-3} + \frac{B}{x+1}$$

$$\frac{12x+5}{(x-3)(x+1)} = \frac{A}{x-3} + \frac{B}{x+1}$$

(إ)

$$\underline{\text{let } x=3}$$

$$A = \frac{41}{4}$$

$$\underline{\text{let } x=-1} \quad B = \frac{-7}{-4} = \frac{7}{4}$$

$$\therefore f(x) = (x+2) + \frac{41/4}{x-3} + \frac{7/4}{x+1}$$

الخطوة التالية هي إيجاد المقدار المطلوب من المقادير المجهولة Ⓛ

$$\frac{2x^2+1}{(x-1)^3} \longrightarrow b$$

$$\frac{2x^2+1}{(x-1)^3} = \frac{a}{(x-1)} + \frac{b}{(x-1)^2} + \frac{c}{(x-1)^3}$$

[إيجاد المقدار] $(x-1)^3$ يتساوى بـ

$$2x^2+1 = a(x-1)^2 + b(x-1) + c$$

$$\underline{x=1} \longrightarrow c = 3 \quad \text{نحصل على}$$

$$\begin{array}{l} \underline{x=0} \\ \underline{x=2} \end{array}$$

$$1 = a - b + 3$$

$$9 = a + b + 3$$

Ⓐ

$$\begin{array}{r} a - b + 3 = 1 \\ a + b + 3 = 9 \\ \hline 2a = 8 \end{array}$$

$$2b = 8$$

$$a = 3$$

$$b = 4$$

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

if $F(x) = \frac{2x^2 + 3x + 5}{(x^2 - 1)(x+1)}$

$$\frac{2x^2 + 3x + 5}{(x-1)(x+1)^2} = \frac{a}{x-1} + \frac{b}{x+1} + \frac{c}{(x+1)^2}$$

نحو نحیی
جبر و حساب

$$x=1$$

$$a = \frac{1}{4} = 2.5$$

$$x=-1$$

$$c = \frac{4}{-2} = -2$$



$$(x-1)/(x+1)^2 \text{ is } \cancel{\text{irrational}}$$

$$2x^2 + 3x + 5 = a(x+1)^2 + b(x-1)(x+1) + c(x-1)$$

Let $x = 0$

$$5 = 2 - a - b + 2$$

$$b = -\frac{1}{2}$$

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

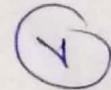
Resolve

$$\frac{2x^2 + 3x + 5}{(x-1)(x+1)^2} = \frac{a}{x-1} + \frac{b}{x+1} + \frac{c}{(x+1)^2}$$

$$(x-1)(x+1)^2 \text{ is } \cancel{\text{irrational}}$$

$$2x^2 + 3x + 5 = a(x+1)^2 + b(x-1)(x+1) + c(x-1)$$

$$2x^2 + 3x + 5 = a(x^2 + 2x + 1) + b(x^2 - 1) + c(x-1)$$



$x \rightarrow$ مقدار

$$\underline{x^2} \rightarrow 2 = a + b$$

$$x \rightarrow 3 = 2a + c$$

$$x^0 \rightarrow 5 = a - b - c$$

$$a = \frac{3}{2} \quad b = -\frac{1}{2} \quad c = -2$$

Resolve

$$\frac{16}{(x-1)^2}$$

$$\frac{16}{(x-1)^2(x+1)^2} = \frac{a}{x-1} + \frac{b}{(x-1)^2} + \frac{c}{x+1} + \frac{d}{(x+1)^2}$$

$$x=1 \quad b = 16/4 = 4$$

$$x=-1 \quad d = 16/4 = 4$$

$$(x-1)^2/(x+1)^2 \leftarrow \text{مقدار}$$

$$16 = a(x-1)(x+1)^2 + b(x+1)^2 + c(x-1)^2(x+1) + d(x-1)^2$$

Ⓐ

$$16 = a(x-1)(x+1)^2 + 4(x+1)^2 + c(x-1)^2(x+1) \\ + 4(x-1)^2$$

ما نفرض اولاً نصل إلى صورتين ①
أدخل الـ 4 بوك ونصل إلى المعاك ②

$$\underline{x=0} \quad 16 = -a + 4 + c + 4$$

$$c - a = 8 \quad ①$$

$$\underline{x=2} \quad 16 = 9a + 36 + 3c + 4$$

$$-24 = 9a + 3c$$

$$c + 3a = -8 \quad ②$$

$$c - a = 8$$

$$\begin{array}{r} -c + 3a = -8 \\ \hline \end{array}$$

$$-4a = 16$$

$$a = -4$$

$$c = 4$$

$$f(x) = \frac{-4}{x-1} + \frac{4}{(x-1)^2} + \frac{4}{(x+1)} + \frac{4}{(x+1)^2}$$

③

اذاً المقام من المقامات $\frac{2x+5}{(x^2+4)(x-1)}$ (٤)

$$\frac{2x+5}{(x^2+4)(x-1)} \quad \xrightarrow{\text{ب}} \quad$$

$$\frac{2x+5}{(x-1)(x^2+4)} = \frac{A}{x-1} + \frac{Bx+C}{x^2+4}$$

$$\text{let } x=1 \quad A = \frac{7}{5}$$

$$(x^2+4)(x-1) \quad \leftarrow \text{مخرج}$$

$$2x+5 = A(x^2+4) + (Bx+C)(x-1)$$

$$x=0 \quad \text{ويجيء}$$

$$5 = 4A - C$$

$$5 = \frac{28}{5} - C$$

$$C = 3/5$$

$$x=2 \quad g = \frac{56}{5} + 2\beta + 3/5$$

$$2\beta = -14/5 \quad \text{---} \quad \beta = -7/5$$

$$f(x) = \frac{7/5}{x-1} + \frac{-\frac{7}{5}x + 3/5}{x^2 + 4}$$

Resolv

$$\frac{2x^2 + 3}{(x^2 + 4)(x^2 + 1)}$$

$$\underline{x^2 = y}$$

$$\frac{2y+3}{(y+4)(y+1)} = \frac{A}{y+1} + \frac{B}{y+4}$$

$$\underline{y = -1}$$

$$A = 1/3$$

$$\underline{y = -4} \quad B = -\frac{5}{-3} = 5/3$$

$$f(x) = \frac{1/3}{x^2 + 1} + \frac{5/3}{x^2 + 4}$$

Factorize

$$\frac{x^4}{x^3 - 1}$$

$$\begin{array}{r} \overbrace{}^b \\ \frac{x^3 - 1}{x^4 + x} \end{array}$$

$$\frac{x^4}{x^3 - 1} = x + \frac{c}{x^3 - 1}$$

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

$$= x + \frac{A}{x-1} + \frac{Bx+c}{x^2+x+1}$$

$$\frac{x}{(x-1)(x^2+x+1)} = \frac{A}{x-1} + \frac{Bx+c}{x^2+x+1} \quad \textcircled{1}$$

$$\text{Let } x = 1$$

$$A = \frac{1}{3}$$

$$(x^2+x+1) (x-1)$$

نحوه المقادير

$$x = A(x^2+x+1) + (Bx+c)(x-1)$$

(1c)

$$\text{Let } x=0 \quad 0 = A - C \quad C = \frac{1}{3}$$

$$\text{Let } x=2 \quad 2 = 7A + 2B + C$$

$$2 = \frac{7}{3} + 2B + \frac{1}{3}$$

$$2B = -2\frac{1}{3}$$

$$f(x) = x + \frac{\frac{1}{3}}{x-1} + \frac{-\frac{1}{3}x + \frac{1}{3}}{x^2 + x + 1}$$

$$\text{Resoln} \quad \frac{2x^3 + 5x^2 + 1}{(x^2 + 4)(x^2 + 1)}$$

$$\frac{2x^3 + 5x^2 + 1}{(x^2 + 4)(x^2 + 1)} = \frac{Ax + B}{x^2 + 4} + \frac{Cx + D}{x^2 + 1}$$

i = sp - L

$$2x^3 + 5x^2 + 1 = (Ax + B)(x^2 + 1) + (Cx + D)(x^2 + 4)$$

(18)

$$\text{let } x = i = \sqrt{-1} = \tilde{0}$$

$$-2i - s + 1 = 0 + (ci + d)(z) \quad \left. \right\}$$

$$-4 - 2i = 3ci + 3d$$

$$d = -4/3 \quad c = -2/3$$

$$\text{let } x = 2i$$

$$-16i - 2s + 1 = (2ai + b)(-3)$$

$$-19 - 16i = -6ai - 3b$$

$$b = \frac{19}{3} \quad a = \frac{16}{6} = 8/3$$

$$\underline{\underline{R}} \quad 2x^3 + 5x^2 + 1 = A(x^3)(x^2 + 1) \\ + (Cx + D)(x^2 + 1) \\ \therefore \text{Ansatz, etc}$$

$$\underline{\underline{x^3}} \quad 2 = A + C$$

$$x^2: \quad s = B + D$$

(E)

$$X \rightarrow$$

$$0 = A + 4C$$

$$X \rightarrow$$

$$1 = B + 4D$$

$$A + C = 2$$

$$B + D = 5$$

$$A + 4C = 0$$

$$B + 4D = 1$$

$$C = -2/3$$

$$D = -4/3$$

$$A = 8/3$$

$$B = \frac{19}{3}$$

$$f(x) = \frac{\frac{8}{3}x + \frac{19}{3}}{x^2 + 4} + \frac{-\frac{2}{3}x - \frac{4}{3}}{x^2 + 1}$$

المقدمة في الميكانيكا

جامعة عجمان

$$\frac{2x^3 + 5x^2 + 7}{(x^2 + 1)^2}$$

(10)

$$\frac{2x^3 + 5x^2 + 7}{(x^2 + 1)^2} = \frac{Ax + B}{(x^2 + 1)} + \frac{Cx + D}{(x^2 + 1)^2}$$

$(x^2 + 1)^2$ a jadu.

$$2x^3 + 5x^2 + 7 = (Ax + B)(x^2 + 1) + (Cx + D)$$

Let $x = i$

$$-2i - 5 + 7 = 0 + Ci + Di$$

$$2 - 2i = Di + Ci$$

$$D = 2 \quad \underline{\underline{C_2 = 2}}$$

Let $x = 0$

$$7 = B + D$$

$$B = 5$$

$x = 1$

$$14 = 2B + 2A + C + D$$

$$14 = 10 + 2A - 2 + 2$$

$$A = 2$$

$$(1) f(x) = \frac{2x+5}{x^2+1} + \frac{-2x+2}{(x^2+1)^2}$$

b-wResolve

$$\textcircled{1} \quad \frac{2x^2 + 5}{(x-1)(x+1)}$$

$$\textcircled{2} \quad \frac{\sqrt{x}}{x^2 - 1} \quad [x = y^2]$$

$$\textcircled{3} \quad \frac{x^3 + 5}{x^3 - x^2 + x - 1} \rightarrow x^2(x-1) + (x-1) \\ = (x-1)(x^2 + 1)$$

$$\textcircled{4} \quad \frac{\cos x}{3 + \sin^2 x} = \frac{\cos x}{4 \neq \cos^2 x} \rightarrow \cos x = y$$

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

$$\textcircled{6} \quad \frac{16}{x^4 - 1} = \frac{16}{(x^2 - 1)(x^2 + 1)} = \frac{16}{(x-1)(x+1)(x^2 + 1)}$$