




Hello ,  
The conditions of a local extrema  
existence\_Đkiệncựctri tại  $x_0$   
chotrước




Here are some examples for the  
calculation steps on a local  
extrema existence conditions .



1 .  
Determine the values of  
parameter m of the function

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

for which it reaches local extremum at  $x = -1$



Click the picture to view solution  
of 1. ( cont' )

"Ham so co dang :  $y = \frac{1}{3}x^3 - mx^2 + (-2m^2 - m)x + 1$

"Tap xac dinh :  $D = \mathbb{R}$

"Dao ham cap 1 la :  $y'(x) = x^2 - 2mx - 2m^2 - m$

"Ham co cuc tri  $\Leftrightarrow y'(x)=0$  co nghiem & kem theo dk cua m "

"Xet phuong trinh bac 2 tham so m :  $y'(x) = 0 \Leftrightarrow x^2 - 2mx - 2m^2 - m = 0$

"Dieu kien ton tai ptb2 :  $\Leftrightarrow a = 1 \neq 0$ , tinh va xet dau Delta "

"##BUOC1## :Bieu thuc he so a cua  $y'(x)$  la : 1

"##BUOC2## :Tinh Delta cua dao ham  $y'(x)$  :Delta =  $12m^2 + 4m$

"##BUOC3## :Tim nghiem : Delta = 0 & lap bang xet dau Delta "

" a = 1  $\neq 0$ , " $\Leftrightarrow$ ",  $m \neq ( )$

"Delta =0  $\Leftrightarrow$ ",  $12m^2 + 4m = 0$

"Xet dau , ta co dieu kien de ham so co 2 cuc tri la :  $\{m < \frac{-1}{3}\}, \{0 < m\}$

"Ket huan : "

"Ham so co 2 cuc tri : $\Leftrightarrow$ ",  $\{m < \frac{-1}{3}\}, \{0 < m\}$

" Thay hoanh do  $x_1 = -1$ , " vao  $y'(x) = x^2 - 2mx - 2m^2 - m, " = 0 "$

" Ta thu duoc :  $1 + m - 2m^2 = 0$

" Nghiem m la : "

$\{m = \frac{-1}{2}\}, \{m = 1\}$

" Kiem tra :"

" \*\*\*\*\*Truong hop I ; ung voi m = ",  $\{m = \frac{-1}{2}\}$ , "\*\*\*\*\*"

"Ham so co dang : y = ",  $\frac{1}{3}x^3 - mx^2 + (-2m^2 - m)x + 1$

" Heso a = ",  $\frac{1}{3}$ , " heso b = ",  $\frac{1}{2}$ , "heso c = ", 0, "heso d = ", 1

" Thay ",  $\{m = \frac{-1}{2}\}$ , " vao ( Cm ) ta co : y = ",  $\frac{1}{3}x^3 + \frac{1}{2}x^2 + 1$

" Dao ham cap hai : y'(x) = ",  $2x + 1$

" Dao ham cap 2 tai x = ", -1, "co gia tri la : y'('(-1, ") = ", -1

" Ham so dat CUC DAI tai x = ", -1, " ung voi gia tri ",  $\{m = \frac{-1}{2}\}$

KET THUC BAI TOAN TIM DK CO CTRI TAI Xo CUA HAM SO BAC 3

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" \*\*\*\*\*Xet them truong hop II ; ung voi m = ",  $\{m = 1\}$ , "\*\*\*\*\*"

"Ham so co dang : y = ",  $\frac{1}{3}x^3 - mx^2 + (-2m^2 - m)x + 1$

" Heso a = ",  $\frac{1}{3}$ , " heso b = ", -1, "heso c = ", -3, "heso d = ", 1

" Thay ",  $\{m = 1\}$ , " vao ( Cm ) ta co : y = ",  $\frac{1}{3}x^3 - x^2 - 3x + 1$

" Dao ham cap hai : y'(x) = ",  $2x - 2$

" Dao ham cap 2 tai x = ", -1, "co gia tri la : y'('(-1, ") = ", -4

" Ham so dat CUC DAI tai x = ", -1, " ung voi gia tri ",  $\{m = 1\}$



2.

Determine the values of parameter  $m$  of the function

$$y = x^4 + (m^2 - m - 2).x^2 + 3.m^2 + 1$$

for which it reaches local extremum at  $x = 1$



Click the picture to view solution of 2. ( cont' )

> cttB4t( 1 , m^2-m-2 , 3\*m^2+1 , 1 );

"Ham so co dang :  $y = x^4 + (m^2 - m - 2)x^2 + 3m^2 + 1$

"Tap xac dinh :  $D = \mathbb{R}$  "

"Dao ham cap 1 la :  $y'(x)$  ", " $y'(x) = 4x^3 + 2xm^2 - 2xm - 4x$

"Ham co cuc tri  $\Leftrightarrow y'(x)=0$  co nghiem & kem theo dk cua m "

"Xet phuong trinh bac 2 tham so m :  $y'(x) = 0 \Leftrightarrow 4x^3 + 2(m^2 - m - 2)x = 0$

"Dieu kien ton tai ptb2 :  $\Leftrightarrow a = 4 \neq 0$ , " tinh va xet dau Delta "

"##BUOC1## :Bieu thuc he so a cua  $y'(x)$  la : 4

"##BUOC2## :Tinh Delta cua dao ham  $y'(x)$  :Delta =  $-32m^2 + 32m + 64$

"##BUOC3## :Tim nghiem : Delta = 0 & lap bang xet dau Delta "

" a =  $4 \neq 0$ , " $\Leftrightarrow$ ",  $m \neq ( )$

"Delta =0  $\Leftrightarrow -32m^2 + 32m + 64 = 0$

"Xet dau , ta co dieu kien de ham so co 2 cuc tri la :  $\{-1 < m, m < 2\}$

"-----"

"Ket luan : "

"Ham so co 3 cuc tri : $\Leftrightarrow \{-1 < m, m < 2\}$

" Thay hoanh do  $x_1 = 1$ , " vao  $y'(x) = 4x^3 + 2xm^2 - 2xm - 4x = 0$  "

" Ta thu duoc :  $2m^2 - 2m = 0$

" Nghiem m la : "

$\{m = 0\}, \{m = 1\}$

"-----"



" Kiem tra :"

" \*\*\*\*\*Truong hop I ; ung voi m = ",  $\{m = 0\}$ , "\*\*\*\*\*"

"Ham so co dang : y = ",  $x^4 + (m^2 - m - 2)x^2 + 3m^2 + 1$

" Heso a = ", 1, " heso b = ", -2, "heso c = ", 1

" Thay ",  $\{m = 0\}$ , " vao ( Cm ) ta co : y = ",  $x^4 - 2x^2 + 1$

" Dao ham cap hai : y'(x) = ",  $12x^2 - 4$

" Dao ham cap 2 tai x = ", 1, "co gia tri la : y' ('(, 1, ") = ", 8

" Ham so dat CUC TIEU tai x = ", 1, " ung voi gia tri ",  $\{m = 0\}$

KET THUC BAI TOAN TIM DK CO CTRI TAI Xo CUA HAM SO BAC 4

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" \*\*\*\*\*Xet them truong hop II ; ung voi m = ",  $\{m = 1\}$ , "\*\*\*\*\*"

"Ham so co dang : y = ",  $x^4 + (m^2 - m - 2)x^2 + 3m^2 + 1$

" Heso a = ", 1, " heso b = ", -2, "heso c = ", 4

" Thay ",  $\{m = 1\}$ , " vao ( Cm ) ta co : y = ",  $x^4 - 2x^2 + 4$

" Dao ham cap hai : y'(x) = ",  $12x^2 - 4$

" Dao ham cap 2 tai x = ", 1, "co gia tri la : y' ('(, 1, ") = ", 8

" Ham so dat CUC TIEU tai x = ", 1, " ung voi gia tri ",  $\{m = 1\}$

KET THUC BAI TOAN TIM DK CO CTRI TAI Xo CUA HAM SO BAC 4

3.

Determine the values of parameter  $m$  of the function

$$y = ( m.x^2 + (m+1).x + 1 ) / ( -2.x + 1 )$$

for which it reaches local extremum at  $x = 2$



Click the picture to view solution of 3. ( cont' )



"Ham so co dang :  $y = \frac{m x^2 + (m + 1) x + 1}{-2 x + 1}$  "

"Tap xac dinh :  $D = \mathbb{R} - \{\frac{1}{2}\}$  "

"Dao ham cap 1 la :  $y'(x)$  ", " $y'(x) = -\frac{2 m x^2 - m - 3 - 2 m x}{(2 x - 1)^2}$  "

"Ham co cuc tri  $\Leftrightarrow y'(x)=0$  co nghiem & kem theo dk cua m "

"Xet phuong trinh bac 2 tham so m :  $y'(x) = 0 \Leftrightarrow -\frac{2 m x^2 - m - 3 - 2 m x}{(2 x - 1)^2} = 0$  "

"Dieu kien ton tai ptb2  $\Leftrightarrow a = -2 m \neq 0$ , " tinh va xet dau Delta "

"##BUOC1## :Bieu thuc he so a cua  $y'(x)$  la :",  $-2 m$

"##BUOC2## :Tinh Delta cua dao ham  $y'(x)$  :Delta =",  $12 m^2 + 24 m$

"##BUOC3## :Tim nghiem : Delta = 0 & lap bang xet dau Delta "

" a =",  $-2 m \neq 0$ , " $\Leftrightarrow$ ",  $m \neq 0$

"Delta=0  $\Leftrightarrow$ ",  $12 m^2 + 24 m = 0$

"Xet dau , ta co dieu kien de ham so co 2 cuc tri la :",  $\{\{m < -2\}, \{0 < m\}\}$

"Ket luan : "

"Ham so co 2 cuc tri  $\Leftrightarrow$ ",  $\{\{m < -2\}, \{0 < m\}\}$

" Thay hoanh do  $x_1 = 2$ , " vao  $y'(x) = -\frac{2 m x^2 - m - 3 - 2 m x}{(2 x - 1)^2}$ , " = 0 "

" Ta thu duoc :",  $-\frac{1}{3} m + \frac{1}{3} = 0$

" Ta thu duoc : ",  $-\frac{1}{3}m + \frac{1}{3} = 0$

" Nghiem m la : "

$\{m = 1\}$

"-----"

"&&LUU Y ung dung !!!"

" Hay doc ky huong dan duoi day !!!"

" Neu ket luan la  $\{m\} = \{m\}$  thi he co nghiem tuy y doi voi dieu kien cua tham so m ;  $\{m\} = \mathbb{R}$  "

" Neu bai toan khong chi ro nghiem m thi bai toan Vo nghiem "

"CHUC CAC BAN THANH CONG !!!"

" Kiem tra :"

" \*\*\*\*\*Truong hop I ; ung voi m = ",  $m = 1$ , "\*\*\*\*\*"

"Ham so co dang : y = ",  $\frac{m x^2 + (m + 1) x + 1}{-2 x + 1}$

" Heso a = ", 1, " heso b = ", 2, "heso c = ", 1, "heso d = ", -2, "heso e = ", 1

" Thay ",  $m = 1$ , " vao ( Cm ) ta co : y = ",  $\frac{x^2 + 2 x + 1}{-2 x + 1}$

" Dao ham cap hai :  $y'(x) =$ ",  $-18 \frac{1}{(2 x - 1)^3}$

" Dao ham cap 2 tai x = ", 2, " co gia tri la :  $y' (", 2, ") =$ ",  $\frac{-2}{3}$

" Ham so dat CUC DAI tai x = ", 2, " ung voi gia tri ",  $m = 1$

## CI2b.Examples for CI2a\_Đkiệncựctri tại x0 chotrước

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