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

Under $(x-2)^3$: P, under $(x-4)$: Q

①

$P' = 3(x-2)^2 \cdot \frac{d}{dx}(x-2)$ $Q' = 1$

$P' = 3(x-2)^2$

$P'Q + PQ'$

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

$y' = (x-2)^2[3(x-4) + x-2]$

$y' = (x-2)^2(3x-12+x-2)$

$y' = (x-2)^2(4x-14)$

$= 2(x-2)^2(2x-7)$

Under $(x-2)^2$: P, under $(2x-7)$: Q

$P' = 2(x-2)' \cdot \frac{d}{dx}(x-2)$ $Q' = 2$
$= 2(x-2)$

$P'Q + PQ'$

$y'' = 2\left[2(x-2)(2x-7) + (x-2)^2(2)\right]$

$y'' = 2\cdot2(x-2)[2x-7 + x-2]$

$y'' = 4(x-2)(3x-9)$

$y'' = 4\cdot3(x-2)(x-3)$

$y'' = 12(x-2)(x-3)$

② $12(x-2)(x-3) = 0$

$x-2 = 0$ $x-3 = 0$

$x = 2$ $x = 3$ C.V.'s

③

TEST CASES	$x = 0$	$x = \frac{5}{2}$	$x = 4$
PLUG INTO y''	$12(x-2)(x-3)$ $12(0-2)(0-3)$ $+$ $\smile$	$12(\frac{5}{2}-2)(\frac{5}{2}-3)$ $-$ $\frown$	$12(4-2)(4-3)$ $+$ $\smile$

with $x=2$ and $x=3$ marking boundaries from $-\infty$ to ∞

④

POI
$x = 2$

$y = (x-2)^3(x-4)$
$= (2-2)^3(2-4)$
$= 0$

(POI : (2,0))

POI
$x = 3$

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

(POI : (3,-1))