3.4 Review

4) sum of first and twice the second is 100 and product is a maximum.

let x be the first, y the second, P be product

$P = xy$

$x + 2y = 100$

$x = 100 - 2y$

$\rightarrow P = (100 - 2y)y$ domain: all reals

$= 100y - 2y^2$

$P' = 100 - 4y = 0$

$100 = 4y$

$y = 25$ critical number

$x + 2(25) = 100$

$x + 50 = 100 \rightarrow x = 50$

$xy = 50(25) = 1250$

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21) 90 orange trees/acre $\rightarrow$ 700 orange/tree

Each additional tree/acre decrease yield by 25 orange/tree

a) Yield $= Y$ number of trees per acre $= t$ oranges per tree $= x$

$Y = tx$

$-25x$

(Yield = (number of trees)(oranges per tree)

total number of trees $= 90 + y$ y = some trees

oranges per tree $= 700 - 25y$

$\text{Yield} = (90 + y)(700 - 25y)$ Want to maximize yield

$\frac{dY}{dy} = (90+y)(-25) + (700-25y)(1)$ Domain: $90 + y \geq 0$

$= -2250 - 25y + 700 - 25y$ $y \geq -90$

$= -1550 - 50y = 0 \rightarrow 1550 = -50y$

$y = -31$ then $90 - 31 = 59$ total trees to max. yield