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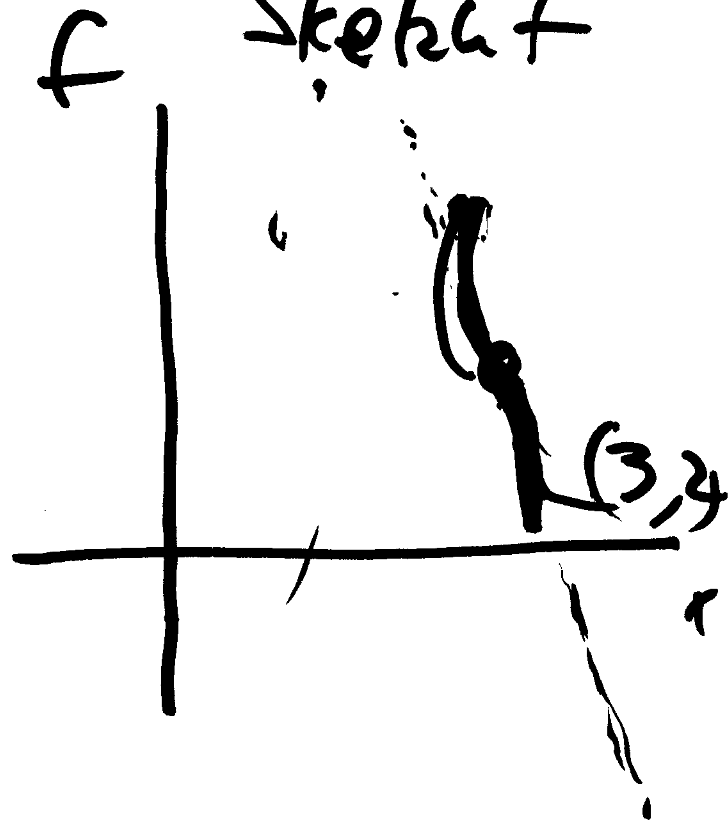
$f(3) = 2$

$f'(3) = -4$

$f''(3) = 0$

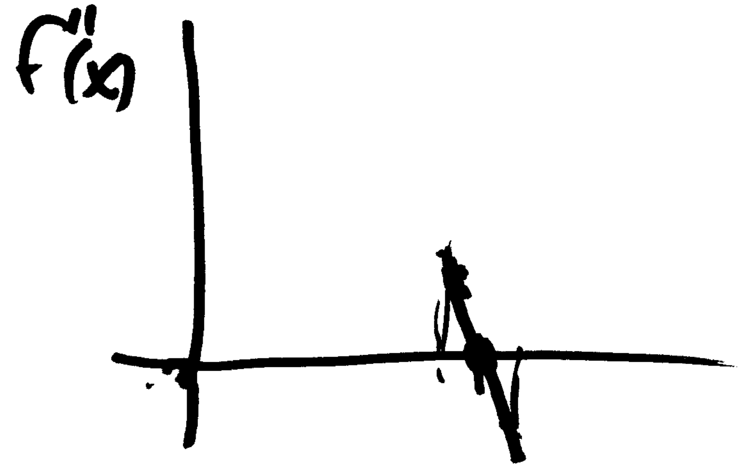
$f'''(3) = \underline{-1}$

Sketch f



Example of f: $f(x) = 2 + {-4}(x-3) + 0\frac{(x-3)^2}{2} + (-1)(x-3)^3/6$

Equation of Tangent line at $x = 3$: $y - 2 = -4(x-3)$



$$f(x) = 2 - 4\,\frac{(x-3)^1}{1} + 0\,\frac{(x-3)^2}{2!} - 1\,\frac{(x-3)^3}{6}$$

$$f(3) = 2$$

$$f'(x) = -4 + 0\,\frac{(x-3)^1}{1} - 1\,\frac{(x-3)^2}{2}$$

$$f'(3) = -4$$

$$f''(x) = 0 - 1\,\frac{(x-3)^1}{1}$$

$$f''(3) = 0$$

$$f'''(x) = -1 \qquad f'''(3) = -1$$

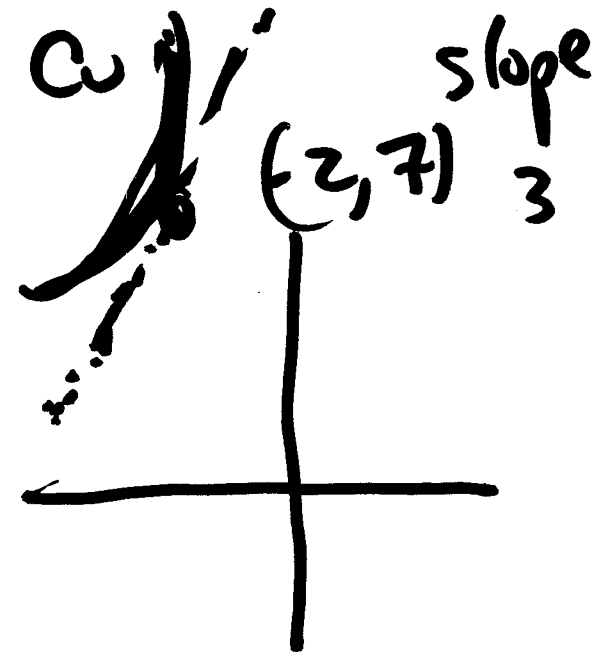
$g(x)$: $g(-2)=7$

$g'(-2)=3$

$g''(-2)=0$

$g'''(-2)=0$

$g^{(4)}(-2)=5$



Example: $g(x)=\underbrace{7+3(x--2)}+0\frac{(x--2)^2}{2}+0\frac{(x+2)^3}{3!}+5\frac{(x+2)^4}{24}$

Tangent line at $x=-2$

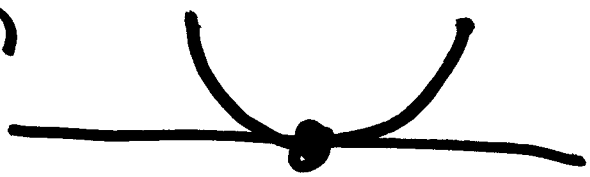
$y-7=3(x--2)$

If

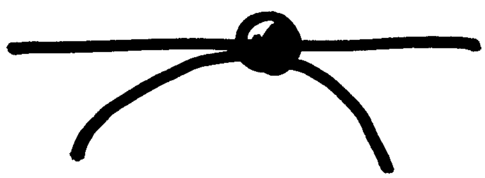
$f''(a) = 0$

4 possibilities

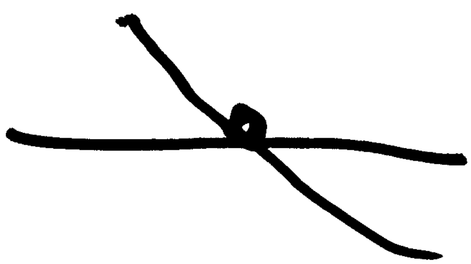
$f(x)$



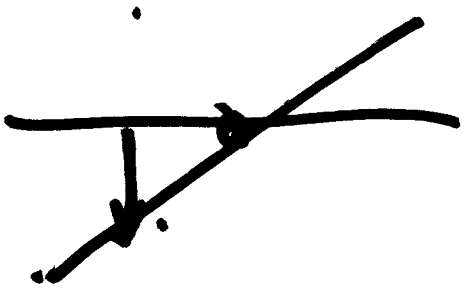
CU . CU

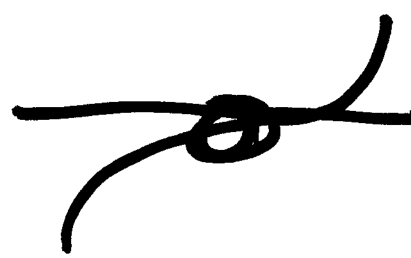


CD CD



I: CU→CD





I CD→CU

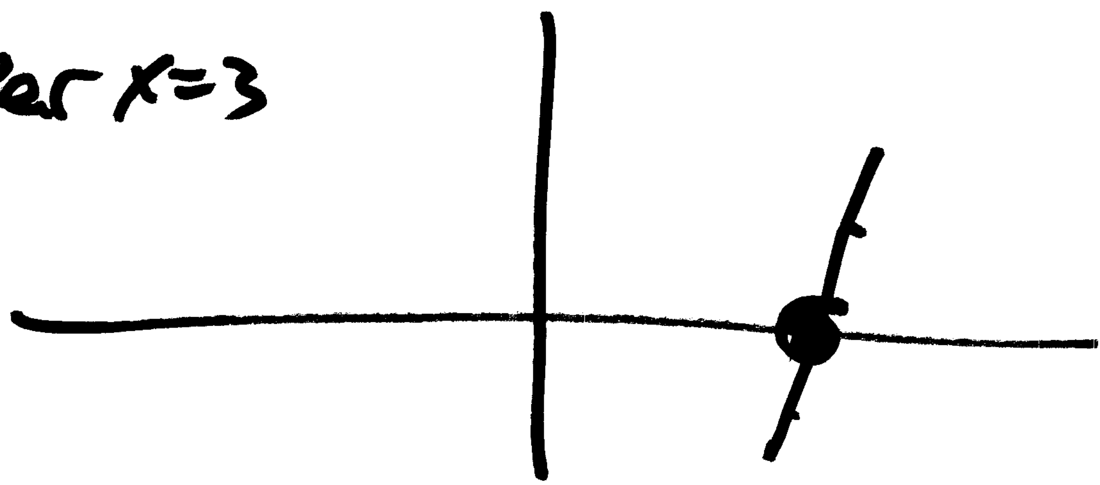
8th deriv

$f^{(8)}(3) = \underline{10}$

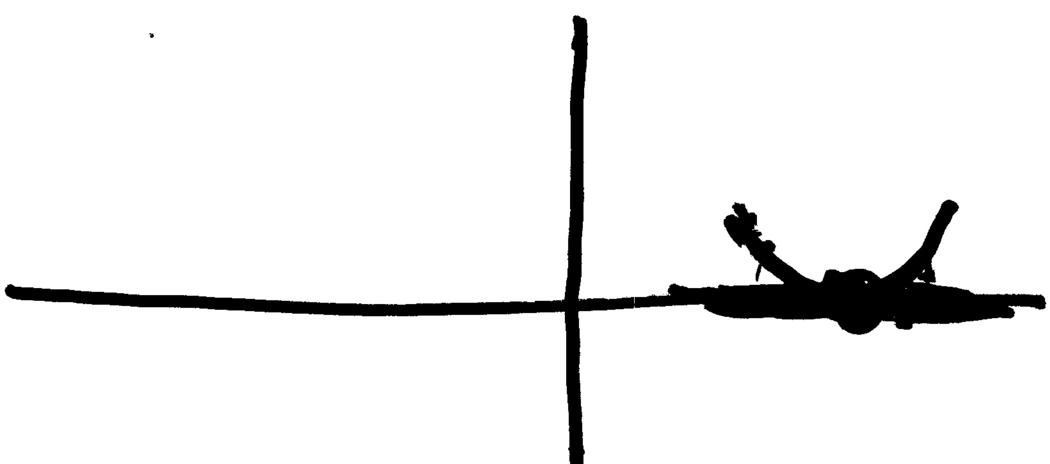
and $f' \, f''(3) \, f''' \, f^{5}$
$f^{(6)} \, f^{(7)}(3) = 0$

$0 \quad 0 \quad \cdots \quad 10\frac{(x-3)^8}{8!}$

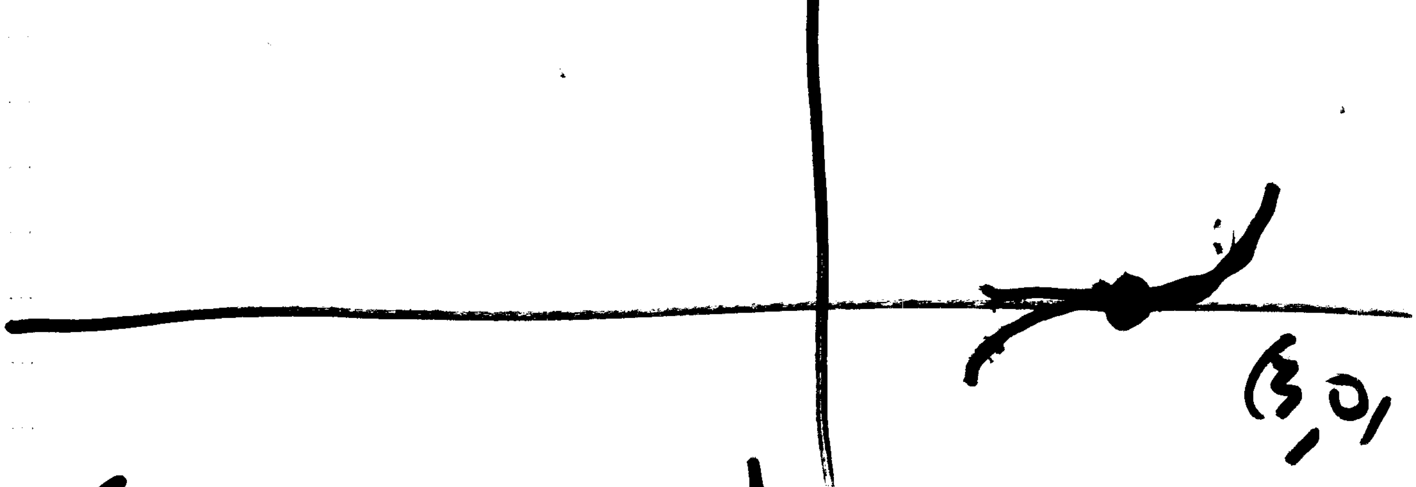
$f^{(7)}(x)$ near $x=3$



$f^{(6)}(x)$ "

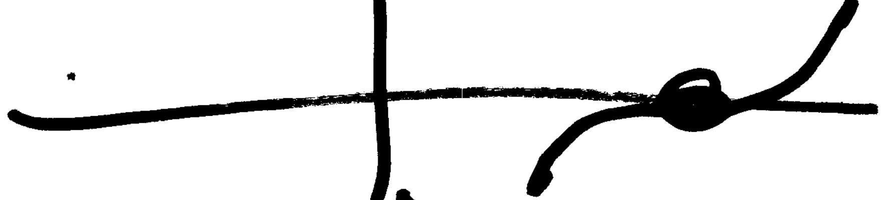


$f^{(5)}(x)$ near $x=3$

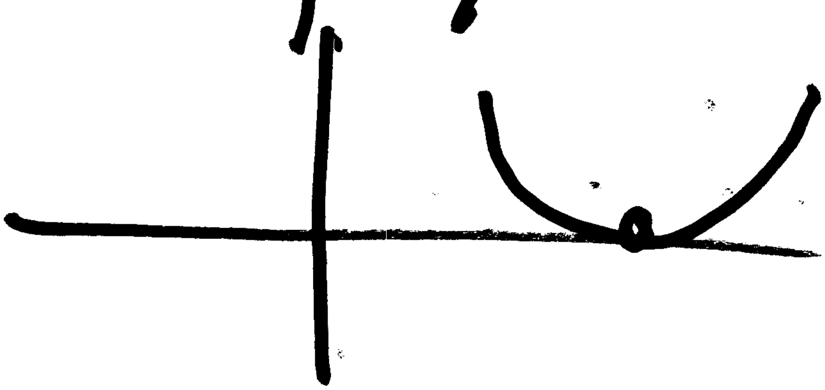


$f^{(4)}(x)$ ...

$f^{(3)}(x)$ near $x=3$



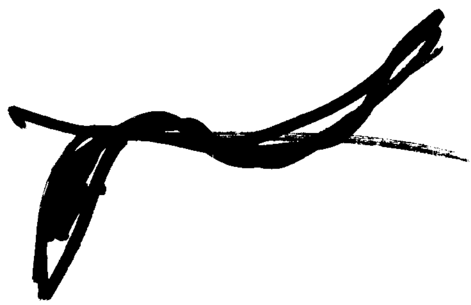
$f''(x)$ near $x=3$



$+1\ x^2$

$-1\ x^2$

$+1\ x^3$



$-1\ x^3$

On top of $f' > 0$

Price $(60-x)$ per unit   Sell $\underline{100}+5x$ unit

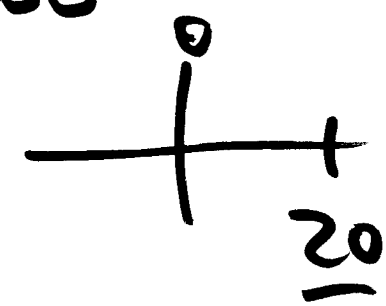
Make $\dfrac{\text{revenue}}{\text{unit}} \times \#\text{units} = $ total revenue

how much less than $\underline{60}$

$\underline{R}(x) = (60-x)(100+5x)$ (product rule?)

$= \underline{-5x^2} + 200x + 6000$

$x = -\dfrac{200}{2\cdot(-5)} = \underline{20}$ $-\dfrac{b}{2a}$



$R'(x) = -10x + 200 = 0$

Price: $60 - 20 = 40$

Sell: $100 + 5\cdot 20 = 200$

$= R(20) = 8000$