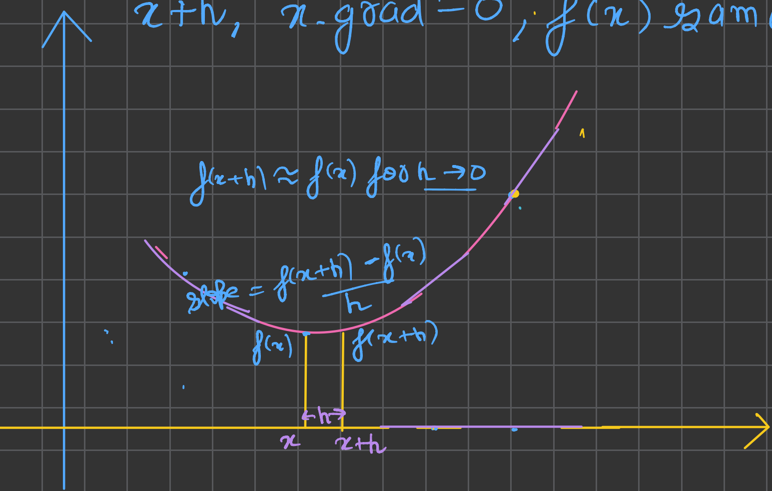
$x+h$, x.grad $=0$, $f(x)$ same.



condition 3

i) Slope $=0$:-

$x \rightarrow (x+h)$

which will be greater

$f(x+h)\uparrow$ or $f(x)\uparrow$

$f(x+h) \approx f(x)$

By Defn slope is the sensitivity of the measure of change of funn w.r.t. input.

The slope of above funn is 0.

so if h is added to x, then funn will definety remain same.

Analytical observation

$y = f(x) \rightarrow$ Polynomial

$x^n = \boxed{nx^{n-1}} \rightarrow \frac{dy}{dx}$

Calculus

x.grad ≈ 0

$x>0$, $f(x)$ remains same

$a, b, c \quad d = \underline{a * b + c}$

$a.grad = \frac{dd}{da}, \quad b.grad = \frac{dd}{db}, \quad c.grad = \frac{dd}{dc}$

Assume, $a = 2, \; b = -3, \; c = 10$ ✓

I $\underline{a = ?}$ $a.grad = ?$

$slope = \frac{f(x+h) - f(x)}{h} = \frac{f(a+h) - f(a)}{h}$

$= \frac{((a+h)*b+c) - (a*b+c)}{h} = \frac{\cancel{a*b} + h*b \cancel{+c} \cancel{-a*b} \cancel{-c}}{h} \approx \boxed{b}$

$\boxed{a.grad = b}$ (Pen & Paper)

$d = a*b+c, \quad a.grad = \frac{dd}{da} = \frac{d}{da}(a*b+c)$

$= \frac{d}{da}(a*b) + \cancel{\frac{dc}{da}}^{0}$ (As, $c = k$, $\underline{b = k2}$)

$= b\frac{da}{da} + a\cancel{\frac{db}{da}}^{0} = b, \quad \boxed{a.grad = b}$ (calculus)

We know that, ~~as~~ $b = -3, \; a > 0, \; a.grad = -3$

$\boxed{a.grad < 0, \quad a > 0, \; d > 0}$

To decrease, d to 0, $\underline{\text{increase } a}$, as grad < 0

Made with Goodnotes

Assume, $a = 2$, $b = -3$, $c = 10$ ✓

$d = a * \underline{b} + c$

If $b = \underset{0}{?}$ b.grad $= \underset{0}{?}$

$$\text{slope} = \frac{f(x+h) - f(x)}{h} = \frac{f(b+h) - f(b)}{h}$$

$$= \frac{((a*(b+h)) + c) - (a*b+c)}{h} = \frac{\cancel{a*b} + a*h \cancel{+c} - \cancel{a*b} \cancel{-c}}{h}$$

$= a$ $\boxed{\text{b.grad} = a}$ (maths defn)

$$d = a*b+c, \quad \frac{dd}{db} = \frac{d}{db}(a*b+c) = \frac{d}{db}(a*b) + \frac{dc}{db}$$

$(c = k,\ a = k2)$

$$= \left(a\frac{db}{db}\right) + \left(b*\cancel{\frac{da}{db}}^{\,0}\right) + \left(\cancel{\frac{dc}{db}}^{\,0}\right)$$

$= a$, $\boxed{\text{b.grad} = a}$ (by calculus)

---

we know that, ~~as~~ $a = 2$, so, b.grad $= 2$

$\boxed{\text{grad} > 0,\ b < 0,\ d > 0}$

To decrease, d to 0, decrease b, as grad > 0

Made with Goodnotes

Assume, $a = 2$, $b = -3$, $c = 10$ ✓

$d = a * b + c$

If $c = ?$ $c.grad = ?$

$$slope = \frac{f(x+h) - f(x)}{h} = \frac{f(c+h) - f(c)}{h}$$

$$= \frac{(a*b+(c+h)) - (a*b+c)}{h} = \frac{\cancel{a*b} + \cancel{c} + h - \cancel{a*b} - \cancel{c}}{\cancel{h}}$$

$$= \boxed{1}$$

$$\boxed{c.grad = 1}$$ (math & defn)

$$d = a*b+c, \quad \frac{dd}{dc} = \frac{d}{dc}(a*b+c) = \frac{d}{dc}(a*b) + \frac{dc}{dc}$$

$$= \cancel{\frac{d(a*b)}{dc}}^{0} + \cancel{\frac{dc}{dc}}^{1} = 1$$

$(a = k, b = k)$

$$\boxed{c.grad = 1}$$ (by calculus)

---

we know that, ~~as~~ $c = 10$, so $c.grad = 1$

$$\boxed{.grad > 0, \quad c > 0, \quad d > 0}$$

To decrease, d to 0, decrease c, as grad > 0

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conclusion $d = a*b + c$

$$a.grad = \frac{dd}{da} = b, \quad b.grad = \frac{dd}{db} = a, \quad c.grad = \frac{dd}{dc} = 1$$