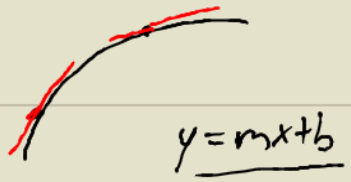
6. $f(x) = x^2 + 2x - 4 \quad (1, -1)$



FINDING EQUATION OF TANGENT LINE AT A GIVEN POINT USING LIMIT DEF.

① FIND DERIVATIVE

(a) IDENTIFY $f(x)$

$f(x) = x^2 + 2x - 4$

(b) FIND $f(x+h)$

$f(x+h) = (x+h)^2 + 2(x+h) - 4$

$= (x+h)(x+h) + 2x + 2h - 4$

$= x^2 + hx + hx + h^2 + 2x + 2h - 4$

$= x^2 + 2hx + h^2 + 2x + 2h - 4$

(c) PLUG INTO FORMULA

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$= \lim_{h \to 0} \frac{x^2 + 2hx + h^2 + 2x + 2h - 4 - (x^2 + 2x - 4)}{h}$$

$$= \lim_{h \to 0} \frac{x^2 + 2hx + h^2 + 2x + 2h - 4 - x^2 - 2x + 4}{h}$$

$$= \lim_{h \to 0} \frac{2hx + h^2 + 2h}{h}$$

$$= \lim_{h \to 0} \frac{h(2x + h + 2)}{h}$$

$$= \lim_{h \to 0} 2x + h + 2$$

$$= 2x + 0 + 2$$

$$f'(x) = 2x + 2$$

② CHANGE $f'(x)$ TO m AND PLUG IN x PART OF POINT:

$m = 2(1) + 2$

$m = 2 + 2$

$m = 4$

③ INTO FORMULA: $y = mx + b$, PLUG IN GIVEN POINT FOR x, y AND m FROM STEP ② AND SOLVE FOR b

$y = mx + b$

$-1 = 4(1) + b$

$-1 = 4 + b$

$-1 - 4 = b$

$-5 = b$

④ WRITE ANSWER

$y = mx + b$

$y = 4x - 5$