MEAN VALUE THEOREM

INTERVAL $[A,B]$

THERE EXISTS A VALUE "c" BETWEEN A & B SUCH THAT: $A<C<B$

$$f'(c) = \frac{f(B)-f(A)}{B-A}$$

$$f(x) = 5 - \frac{7}{x} \qquad [1,7]$$

A) RULES TO USE MVT

① CONTINUOUS on CLOSED INTERVAL $[1,7]$

② DIFFERENTIABLE on OPEN INTERVAL $(1,7)$

B) FIND "c"

$f(1) = 5-7 = -2 \rightarrow (1,-2)$

$f(7) = 5-1 = 4 \rightarrow (7,4)$

$$M = \frac{4-(-2)}{7-1} = \frac{6}{6} = 1$$

$$f'(c) = \boxed{\frac{f(B)-f(A)}{B-A}} \quad \text{SLOPE}$$

$f'(c) = 1$

$f(x) = 5 - 7x^{-1}$

$f'(x) = 5 + 7x^{-2}$

$f'(x) = 0 + \frac{7}{x^2}$

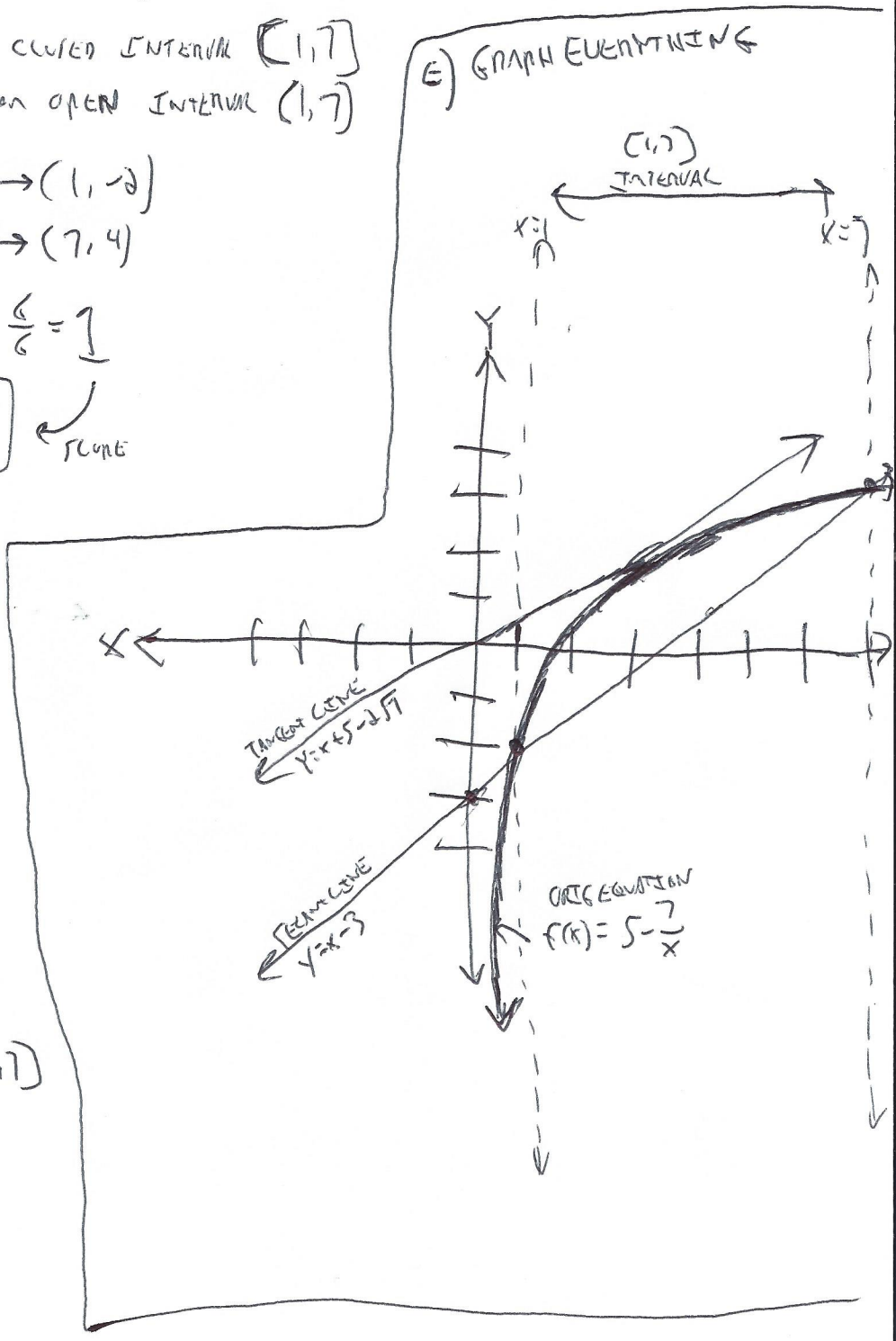
$\frac{7}{x^2} = 1$

$7 = x^2$

$x = \pm\sqrt{7}$

$\boxed{c = +\sqrt{7}}$, $-\sqrt{7}$ ↑ OUTSIDE INTERVAL $[1,7]$

E) GRAPH EVERYTHING



C) EQ. OF SECANT LINE

$m = 1 \quad (1,-2) \quad (7,4)$

$y-4 = 1(x-7)$

$y-4 = x-7$

$\boxed{y = x-3}$

D) EQ. OF TANGENT LINE

$f(c) = f(\sqrt{7}) = 5 - \frac{7}{\sqrt{7}}$

$5 - \frac{7\sqrt{7}}{7}$

(x,y)

$(\sqrt{7}, 5-\sqrt{7}) \leftarrow 5-\sqrt{7}$

$y-(5-\sqrt{7}) = 1(x-\sqrt{7})$

$y-5+\sqrt{7} = x-\sqrt{7}$

$\boxed{y = x+5-2\sqrt{7}}$