5M1 (CONT.) ⑤ $y = \ln(1+x^2)$

P.266 #5

a.) X IS DEFINED FOR ALL X

$1+x^2 > 0$

$x^2 > -1$ ✓ $x \in \mathbb{R}$

b.) THE FCN IS EVEN SINCE $f(x) = f(-x)$

$f(x) = \ln(1+x^2)$

$f(-x) = \ln(1+(-x)^2)$

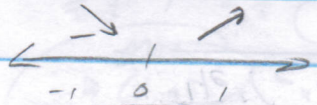
$f(-x) = \ln(1+x^2)$

c.) $f(x) = \ln(1+x^2)$

$f'(x) = \frac{1}{1+x^2} \cdot 2x$

$0 = \frac{2x}{1+x^2}$

$x = 0$



MIN @ (0, 0)

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

$= \frac{2-2x^2}{(1+x^2)^2}$

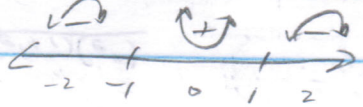
$0 = \frac{2(1-x^2)}{(1+x^2)^2}$

$1-x^2 = 0$

$x = \pm 1$

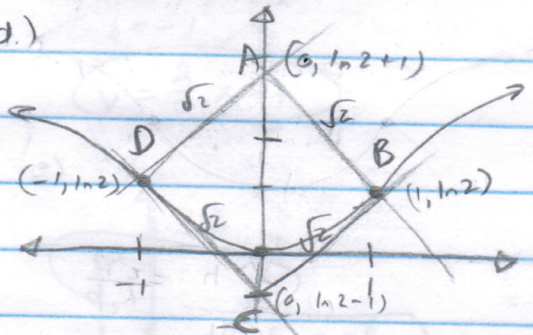
$\ln 2 \approx 0.693$

POINTS OF INFLECTION @ $(-1, \ln 2)$, $(1, \ln 2)$



$\frac{2(1-x^2)}{(1+x^2)^2}$ (+)

d.)



e.) $f'(1) = 1$

$f'(-1) = -1$ } TANGENTS

ALL RT. $\angle$s (OPP. RECIP. SLOPES)

SIDE LENGTHS = $\sqrt{2}$

$A = (\sqrt{2})^2 = 2$ units^2