SHEET # 454 : NAME: KEY Period: ____

MINIMIZING DISTANCE FROM A POINT TO A CURVE

FIND THE DISTANCE FROM THE POINT (P) $(3,-1)$ TO

a, (i) (Q) $(-2,-1) \Rightarrow D = 3-(-2) = \boxed{5}$.

(ii) (R) $(-2,-3)$ $D = \sqrt{(3+2)^2+(-1+3)^2} = \sqrt{25+4} = \boxed{\sqrt{29}}$

b, (x,y) $D = \sqrt{(3-x)^2+(-1-y)^2}$

or $\sqrt{(x-3)^2+(y+1)^2}$

c, THE POINT (S) ON $y = x^2-1$ WHEN $x=2$. $y = 2^2-1 = 3$

POINT $(2,3)$. $D = \sqrt{(3-2)^2+(-1-3)^2} = \sqrt{1^2+4^2} = \boxed{\sqrt{17}}$

d, ANY POINT (T) ON $y = x^2-1$, EXPRESSED AS A FUNCTION OF x ONLY. MAKE A SKETCH.

$D = \sqrt{(3-x)^2+(-1-(x^2-1))^2} = \sqrt{(3-x)^2+(x^2)^2} = \sqrt{(3-x)^2+x^4}$

Correction: add missing parenthesis: (-1 - (x^2-1))^2 = (-1 -x^2 + 1)^2 = (-x^2)^2

e, THE NEAREST POINT (U) ON $y = x^2-1$.

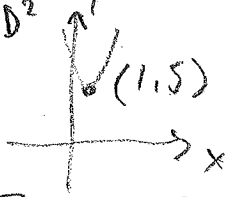
MINIMIZE DISTANCE SQUARED. USE TI-83.

GIVE x AND y COORDINATES.

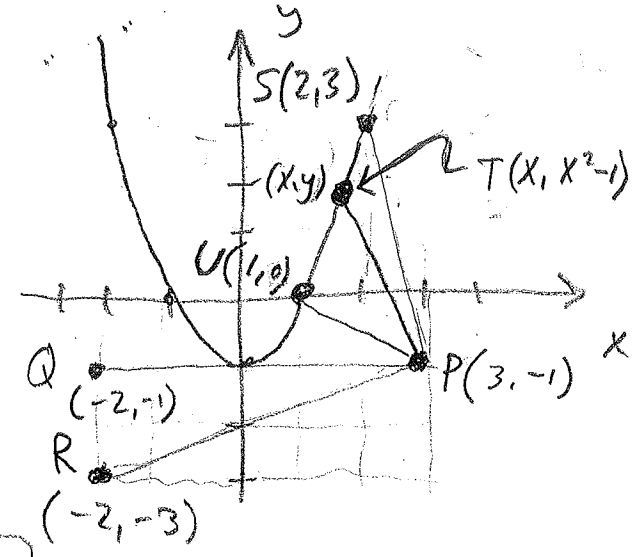
$D^2 = (3-x)^2 + x^4$

MINIMUM:

$D^2 = 5$, $x = 1$



$D = \sqrt{5}$, $y = 1^2-1 = 0$



CLOSEST POINT $(1,0)$, $\sqrt{5}$ AWAY