Notes:

COMPLETING THE SQUARE

WRITE x^2-4x-5 IN THE FORM $(x-a)^2+b$

1) EXPAND $(x-a)^2+b = (x-a)(x-a)+b$
$= x^2-2ax+a^2+b$

2) COMPARE COEFFICIENTS

$x^2-2ax+a^2+b = x^2-4x-5$

x^2 COEF : $1=1$

x COEF :
$-2a=-4$
$a=2$

CONST COEF: $a^2+b=-5$
$4+b=-5$ at $a=2$
$b=-9$

3) ANSWER
$x^2-4x-5=(x-2)^2-9$

FACTORING A QUADRATIC

FACTOR $y=x^2-4x-5$ IN THE FORM $(x-a)(x-b)$

1) EXPAND $(x-a)(x-b) = x^2-(a+b)x+ab$

2) COMPARE COEFFICIENTS
$x^2-(a+b)x+ab = x^2-4x-5$

x^2 COEF : $1=1$

x COEF : $-(a+b)=-4$

CONST COEF : $ab=-5$

CONTINUED...

3) ANSWER
$a=-1$ $b=5$
so $y=(x+1)(x-5)$

PLOT A QUADRATIC

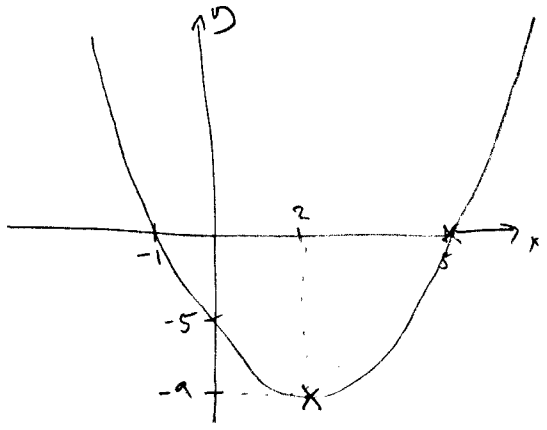
PLOT $y=x^2-4x-5$

1) FIND y INTERCEPT
$x=0 \Rightarrow y=-5$

2) FIND x INTERCEPT (BY FACTORING)
$y=0 \Rightarrow 0=x^2-4x-5$
$=(x+1)(x-5)$
$\Rightarrow x=-1, 5$

3) FIND MIN MAX POINT (BY COMPLETING THE SQUARE)
$y=x^2-4x-5$
$=(x-2)^2-9$
MIN POINT $=(2,-9)$

4) PLOT



Comments:

SOLVING A QUADRATIC INEQUALITY

SOLVE $x^2-4x-5 \leq 0$

1) PLOT $y=x^2-4x-5$

2) READ OFF RANGE OF x THAT MAKES GRAPH ≤ 0

3) ANSWER $1 \leq x \leq 5$