$$Y = 2x^3 - 3x^2 - 14x + 2$$

FIND MINIMUM Y FOR $1.0 \le x \le 3.0$
FIBONACCI SEARCH WITH $n = 7$
$F_7 = 21$ ACCURACY $= \frac{1}{21} = 0.0476$
$\sim 4.8\%$

REGION LENGTH, $L_1 = 3 - 1 = 2.0$
$d_1 = \frac{8}{21} * 2 = 0.38095 * 2 = 0.762$

① EVALUATE AT $1 + 0.762 = 1.762$ $Y = -21.041$
② EVALUATE AT $3 - 0.762 = 2.238$ $Y = -21.939$
AT LOWER LIMIT $X = 1$, $Y = -13$
UPPER LIMIT $X = 3$ $Y = -13$ ELIMINATE $1 \rightarrow 1.762$

$L_2 = 3 - 1.762 = 1.238$
$d_2 = \frac{5}{13} * 1.238 = 0.3846 * 1.238 = 0.476$

$1.762 + 0.476 = 2.238$ $Y = -21.939$
③ EVALUATE AT $3 - 0.476 = 2.524$ $Y = -20.289$
ELIMINATE $2.524 \rightarrow 3$

$L_3 = 2.524 - 1.762 = 0.762$
$d_3 = \frac{3}{8} * 0.762 = 0.375 * 0.762 = 0.286$
④ EVALUATE AT $1.762 + 0.286 = 2.048$ $Y = -22.075$
$2.524 - 0.286 = 2.238$ $Y = -21.939$
ELIMINATE $2.238 \rightarrow 2.524$

$L_4 = 2.238 - 1.762 = 0.476$
$d_4 = \frac{2}{5} * 0.476 = 0.400 * 0.476 = 0.190$
⑤ EVALUATE AT $1.762 + 0.190 = 1.952$ $Y = -21.883$
$2.238 - 0.190 = 2.048$ $Y = -22.075$
ELIMINATE $1.762 \rightarrow 1.952$

$Y = 2x^3 - 3x^2 - 14x + 2$

$L_5 = 2.238 - 1.952 = 0.286$

$d_5 = Y_3 * 0,286 = 0.333 * 0,286 = 0.0953$

$1.952 + 0.0953 \cong 2.048$ $Y = -22.075$

⑥ EVALUATE AT $2.238 - 0.0953 = 2.1427$ $Y = -22.096$

ELIMINATE $1.952 \rightarrow 2.048$

$L_6 = 2.238 - 2.048 = 0,190$

$d_6 = 1/2 * 0.190 = 0.5 * 0.190 = 0.0950$

$2.048 + 0.095 \cong 2,1427$ $Y = -22.096$

⑦ EVALUATE AT $2.238 - 0.095 = 2,1430$ $Y = -22.096$

ELIMINATE $2.1430 \rightarrow 2.238$

FINAL RANGE $\underline{2.048 \leq x \leq 2.1430}$

BEST MINIMUM $Y = -22.0963$ AT $X = 2.1427$

ANALYTICAL CHECK:

$$\frac{dY}{dx} = 0 = 6x^2 - 6x - 14$$

$$\frac{-(-6) \pm \sqrt{(-6)^2 - 4*6*(-14)}}{2*6} = \frac{6 \pm \sqrt{372}}{12}$$

MAXIMUM $\frac{6 - 19,2873}{12} = -1.1073$ $Y = +11.1086$

MINIMUM $\frac{6 + 19,2873}{12} = 2,1073$ $Y = -22.109$

UNIMODAL IN RANGE $1 \rightarrow 3$