Here is an excellent comparison of TK and FORTRAN. The example is obtained from the following textbook: *Introduction to Computing* by James, Smith and Wolford; Harper-Collins.

To build a better mouse trap, the value of spring stiffness (k) is to be determined from the following equation:

$$\frac{Tc + \theta 1 \bullet k}{Tc + \theta 2 \bullet k} = \cos\left[\sqrt{\frac{t \bullet k}{lo}}\right]$$

You will quickly realize that this formula cannot be easily solved using your calculator or spreadsheet. A typical FOTRAN program is given in the textbook as shown below:

```
C REAL ROOT BY SEARCHING WITH CONVERGENCE BY NEWTON–RAPHSON
        REAL K, KN,KN1
        WRITE (6,2)
   2    FORMAT (‘1”,’ROOT DETERMINATION BY SEARCH WITH CONVERGENCE BY’)
        WRITE (6,20)
  20    FORMAT (‘ ‘, 15X, `NEWTON–RAPHSON METHOD’//)
        READ (5,3) DELK, EPSI
   3    FORMAT (2F10.0)
        K=0.2
        FOFK=(0.625+0.3*K)/(0.625+3.27*K)–COS(SQRT(K/0.0006)*.191)
   4    KN=K+DELK
        FOFKN=(0.625+0.3*KN)/(0.625+3.27*KN)–COS(SQRT(KN/0.0006)*.191)
        IF (FOFK*FOFKN) 8,5,7
   5    WRITE (6,6) KN, FOFKN
   6    FORMAT (‘ NEW SPRING CONSTANT = ‘, F5.3, ‘LB–FT/RAD  FOFKN =’) +, F6.4
        STOP
   7    K = KN
        FOFK = FOFKN
        GO TO 4
   8    FOFKN = (0.625+0.3*KN)/(0.625+3.27*KN)–COS(SQRT(KN/0.0006)*.0191)
        A = ((.625+3.27*KN)*.30–(.625+.30*KN)*3.27/(.625+3.27*KN)**2
        B = 0.191/ (2 * .0006) * SQRT (0.0006/KN) * SIN (SQRT (KN/ .0006) * .0191)
        DFOFKN = A + B
        KN1 = KN – FOFKN/DFOFKN
        IF (ABS (KN1 – KN) – EPSI) 10, 10, 9
   9    KN = KN1
        GO TO 8
  10    FOFKN1 = (0.625+0.3*KN1)/(.625+3.27*KN1)–COS(SQRT(KN1/.0006)*.0191)
        WRITE (6,11) KN1, FOFKN1
  11    FORMAT (‘ NEW SPRING CONSTANT = ‘, F5.3, ‘LB–FT/RAD  FOFKN1 =’ +, F6.4
        STOP
        END
```

ROOT DETERMINATION BY SEARCHING WITH CONVERGENCE BY NEWTON–RAPHSON METHOD
NEW SPRING CONSTANT = 3.362 LB – FT/RAD   FOFKN1 = –.0000

Happiness the TK Solver Way!

The TK Solver program to solve the same problem fits on one line! TK Solver does the “Book keeping” and automatically lists all the variables on a separate work sheet.

Rule
(Tc + θ1*k)/(Tc + θ2*k) = cos(sqrt(t*k/lo))