

Programs

This third edition of fxNews contains 14 new programs in file **PROG06V3.g1m**.

NEW! As first explained in the previous edition, fxNews programs are now all **password protected** (password is *FXNEWS*) in order to help prevent accidental corruption of the program code. When users press AC then EXIT to break out of program execution, the fx-9860G immediately enters program edit mode and it is easy to add or delete code before the user realizes what is going on! Password protection prevents this from happening.

Programs are designed to enhance the capability of the fx-9860G graphics calculator. Some programs are simply utilities to speed students through their tests and exams. The program **CMPLXNUM** comes to mind here. **CMPLXNUM** converts between polar and Cartesian forms of any complex number and also evaluates powers, roots and so on.

```
Angle Setup: Rad
Enter z as:
Cartesian ..F1
Polar .....F2
```

```
z=rcisθ
r=2
θ=0.5235987756
→Cart ..F1 Conj ..F4
Roots ..F2 e^z ..F5
Power ..F3 End ..F6
```

```
Nth roots
N?
3
Rows show roots:
1 2 : 3 4
x yi : r θ
- Disp -
```

Another group simply help with common mathematical needs such as finding the perpendicular bisector of two straight lines – **PBISECT** simply returns the equation whilst **PERBIS** also illustrates the solution graphically.

```
Program List
PBISECT * : 516↑
PERBIS * : 904
POLYDIV * : 728
POLYMULT * : 740
QUAD * : 496
TAB * : 1068↓
[EXEC EDIT NEW DEL DELA] P
```

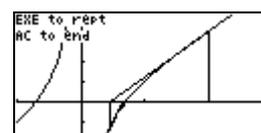
```
Perp bisector
of Point (a,b)
and Point (c,d)
Enter coords:
a=?
```

Other programs set out to help the learning process, often taking the tedium out of repetitive calculations and keeping the focus on the bigger picture. **NWTRPHTT** is an example here, used to illustrate the steps in solving $f(x)=0$ using the Newton-Raphson algorithm. The calculation of successive iterations can be very time consuming. The use of **NWTRPHTT** enables students to quickly explore the choice of a suitable first estimate for x and then calculates and illustrates further iterations.

```
Graph Func :Y=
Y1=2X-1÷X
Y2: [ ]
Y3: [ ]
Y4: [ ]
Y5: [ ]
Y6: [ ]
Y I F X t V t I X
```

```
f(x) in Y1
Ma ERROR last x
is an asymptote
Max iterations?
3
```

```
First x=?
2
0.4444444444
0.6371681416
0.703289104
Plot
- Disp -
```



This collection also includes another simulation program **TAB** that simulates an eight-race horse meet.

Below is a brief description of each program in file **PROG06V3.g1m**.

Name	Description
CIRCUM	Draws triangle and perpendicular bisectors of all sides given coordinates of 3 corners. The intersection of the bisectors is the centre of the circumcircle.
CMPLXNUM	Enter a complex number z in either Cartesian or polar form and then convert between forms, find conjugate, nth power, list nth roots and evaluate e^z .
DOTPROD	Dot product of two vectors (eg $a\mathbf{i} + b\mathbf{j}$), returning product and also angle between vectors
EXACTVAL	Displays exact values of sin, cos and tan for common angles between 0 and 180 degrees.
LINSYS	Solves simultaneous equations $ax+by=c$ and $dx+ey=f$ given a , b , c , d , e and f . Solutions given in both decimal and fractional forms. Traps cases where lines are parallel or equal and explains result.
NWTNRAPH	First enter the function $f(x)$ in Y1. Program then solves $f(x) = 0$ using Newton-Raphson method, displaying all iterations.
NWTRPHTT	Same as NWTNRAPH but also animates iterations graphically.
PBISECT	Returns equation of perpendicular bisector of two points in gradient and standard forms.
PERPBIS	Calculates equation of perpendicular bisector of two points in gradient and standard forms and then plots the two points with the perpendicular bisector shown.
POLYDIV	Divides two polynomials of any order, returning quotient and remainder.
POLYMULT	Multiplies two polynomials of any order together.
QUAD	Returns exact and decimal solutions to a quadratic when presented in the standard $ax^2+bx+c=0$ form.
TAB	TAB simulation of an eight-race horse meeting. You can vary amount of bet, size of bank and % taken by TAB.
TRIGSOLV	Solves \sin , \cos or $\tan(A) = x$ over your chosen range (in either degrees or radians). Solutions displayed in rows with first column degrees, second column radians and third column exact multiples of pi (where possible).