C1

P1: Line utility

0: Two point locus

1: Straight line utility

Koopa St. line (2)

Nebcal locus

132 bytes

```
?→Y:?→A:?→B:?→C:If Y:Then -A/B▲-C/B▲?→X:?→Y:
B▲-A▲AY-BX▲-(BAns+AC)/(A²+B²▲-(C+AAns)/B▲A▲B▲-AX-BY▲
Else ?→D:?→M:1-M²▲Ans▲2CM²-2A▲2DM²-2B▲A²+B²-M²(C²+D²
```

Input mode 1: $Ax+By+C=0$ y intercept, slope
pt X,Y ⊥ line, intersection, // line

mode 0: X,Y X,Y, PB/PA

$Ax^2+By^2+Cx+Dy+E=0$

P2: Polynomial utility

1: Division 2: Polynomial

238 bytes

```
Clr Memory:?→F:Lbl 1:?→A:?→B:?→C:?→M:Y=2⇒Goto 2:
0→Y:While M≥0M-:?→D:A=0⇒(D-CY)/B^(M≥0→D:A⇒(D-BY(M≥0)-CX)/A^(
M>0→D:Y→X:D→Y:WhileEnd:D▲Goto 1:Lbl 2:-B/(3A→B:BCM+;
C/A→C:B²-M/(2A→M:B²-C/3→D:M²-Ans³:If 0>Ans:
Then 2√(D)cos(3⁻¹cos⁻¹(M÷√(D³:Else √(Ans M+:³√(M)
+3√(M-2Ans:If End:Ans+B→A▲3B-Ans→M:M/2+√(AM
-C+M²/4M-→B▲M▲(E3-B)(E3-M▲Goto 1:
```

Input mode 1 Divisor: Ax^2+Bx+C · divided D nebcal division 4

mode 2 Ax^3+Bx^2+Cx+D nebcal cubic1

program 2

P3: Binomial utility 0: request power coefficient 1: request n^{th} term

79 bytes

```
? → Y: ? → A: ? → B: ? → C: ? → D: ? → X: ? → M:
Y=0 ⇒ (BX-M) ⌋ B-D → M: Y M- :
X C M C^(M) A^(X-M ▲ Y M+: Y ⇒ DM-D+B (X-M+1
```

Input mode 0 $(A^B + C^D)^E$ request X^F webcal binomial_S

mode 1 $(A^B + C^D)^E$ request F^{th} term JL

P4: Extended line utility 0: Tangent from point to circle 1: Intersection

Tangent from given slope 307 bytes

```
? → C: ? → A: ? → B: ? → M: If C: Then A ⌋ B → D: -M ⌋ B → C: 1 → M: 1 → X:
0 → Y: ? → M: ? → X: ? → Y: ? → A: XD² - DYM+: ? → B: BD - CY + 2CDX
-A → Y: ? → A: -A → A: XC² + BC - A → X: Else -A ⌋ 2▲ -B, 2▲
√(A² ⌋ 4 + B² ⌋ 4 - M▲ ? → D: A²+B²-4M: 2⁻¹(AD - B + √(Ans D² + Ans▲ →X ▲ AD-B-Ans →Y
? → D: ? → C: 4BC + 4C² - A² + 4M → X: 1▲ -X-Y▲ X²▲
4AD + 4D² - B² + 4M → M: 2AB + 4BD + 4AC + 8DC → Y: IfEnd:
If M: Then (Y + √(Y² - 4XM)) ⌋ [2M → A▲ C-Ans D → B▲
Y ⌋ M-A → X▲ Else X ⌋ Y → X▲ IfEnd: C-Ans D → Y▲ M▲ -M(A+X▲ MPX
```

Input mode 0 circle $x^2+y^2+Ax+By+C$ center (x,y), radius, slope m

point (x,y) tangent $y = mx+C$

mode 1 line $Ax+By+C$

circle $Ax^2+By^2+Cxy+Dx+Ey+D=0$ intersection (x,y)

webcal simultaneous_ext Tangent

176 bytes

```
?→Y: ?→A: ?→D: If Y=1: Then 1⌟(2A→A: Else D→B:
?→C: -B⌟(2A◢ B²-4AC→D: -D⌟(4A◢ (-B+√(D))÷(2A→X◢
(-B-√(D))÷(2A→Y◢ -B◢ D◢ 2A◢ -B⌟Ans◢ If End: If D<0: Then
i→M: Abs(D→D: Else 1→M: If End: Fix 0: 1: While Ans:
Rnd(√D÷Ans)-.5→B: D÷B²→C: Ans-Rnd(Ans⇒Rnd(
C+.5: While End: Norm 1: MB÷(2A◢ C
```

Mode 1: $A\sqrt{B} \rightarrow A\sqrt{B}$

2: $Ax^2+Bx+C=0$ → vertex, roots,

-B B^2-4AC 2A $?\pm?\sqrt{?}$

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87 bytes 2×2 matrix + simultaneous

0: matrix multiplication

1: simultaneous / inverse

```
?→M: ?→A: ?→B: ?→C: ?→D: While 1: AD-CB→X: ?→X:
?→Y: If M: Then AD-CB→M: (XD-BY)⌟M◢ (AY-XC)⌟M◢
Else AX+BY◢ CX+DY◢ If End: While End
```

[. $AB=X$, $CD=Y$

0. $\begin{pmatrix}AB\\CD\end{pmatrix}\begin{pmatrix}X\\Y\end{pmatrix}$

?→D: ?→A: ?→B: If D=0: Then ?→C: -A,B,
-C,B, ?→X: ?→Y: B, -A, -BX+AY, A, B, -AX-BY

Line $Ax+By+C=0$ slope y intercept
// pass through
// pass through

165 bytes

?→A: ?→B: ?→C: ?→D: $(A+D)^2-4(AD-BC$→M: √(Abs(
M))(cos(arg(M + E^-9),2 + i sin(arg(M + E^-9),2))→Y:
(A+D-Y),2→X, X+Y→Y, X-Y→M: If C=0: Then B,
B, X-A, Y-A, Else X-D, Y-D, C, C, IfEnd:
(A-Y),M→Y:
(X-A),M→X: B,M, -Ans, C,M, -Ans, X, Y

Input: $\begin{pmatrix} A & B \\ C & D \end{pmatrix}$ → $\begin{pmatrix} C & D \\ E & F \end{pmatrix}\begin{pmatrix} A & 0 \\ 0 & B \end{pmatrix}\begin{pmatrix} C & D \\ E & F \end{pmatrix}^{-1}$

$\begin{pmatrix} ?A^n+?B^n & ?A^n+?B^n \\ ?A^n+?B^n & ?A^n+?B^n \end{pmatrix}$

Centers 119 bytes complex

?→A: ?→B: ?→C: A+B+C→M: M,3, (B-C),(A-C→D:
C-i(A-B)tan(arg(iDM^-, M,2→Y, Abs(B-C)+Abs(A-C)
-Abs(A-B: Ans-iAnstan(.5 arg(D: C+Ans(.5∠arg(B-C,
-M, iM, Abs(Y)²-Abs(Y-A)², Abs(Y-A)

X+Yi

centroid, orthocenter, circumcenter, incenter, eqt of circumcircle, radii