*CIRCLE, SECANT, TANGENTS v1.01*

Given a circle C: (x - xM)2 + (y - yM)2 = r2 ( xM, yM: center of C, r: radius ) in combination with

1. a point P0 (x0,y0) outside C or
2. Pc (xc,yc) inside C or
3. a straight line f(x) = m\*x + n

this CAS-program finds several items like tangential points P1, P2, equations of tangents T1, T2, equation of the secant f(x),secant having Pc as midpoint, lengths of T1, T2 and chord between P1, P2 on f(x),secant, angle between T1, T2 and the area of the triangle formed by T1, T2 and the chord. Finally the graph of circle and lines is depicted.

The input routine for these cases is as follows:

1. CircleTang(xm,ym,r,x0,y0,0)
2. CircleTang(xm,ym,r,xc,yc,0)
3. CircleTang(xm,ym,r,m,n,1) (The last input variable differentiates between *I)* or *II)* and *III)*

Load CircleTang to the Prime, press the Vars-key, touch the CAS-field on the screen and select

*2 Program*. Then choose CircleTang and fill out the brackets. The further execution is demonstrated by the following examples:

Example to case *I)* Given C: x2 + y2 - 20\*x + 10\*y + 100 = 0 and P0 (17,-6). Find P1, P2, T1, T2 , f(x),secant , and the areaenclosed byT1, T2 , and the chord on f(x),secant.

Solution: First of all complete the equation of C to the square expression:

x2 – 2\*10\*x +102 + y2 + 2\*5\*y + 52 = -100 + 102 + 52 C: (x – 10)2 + (y + 5)2 = 25

(xM,yM) = (10,-5) , r = 5

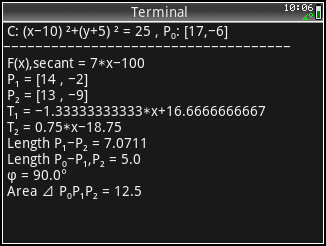
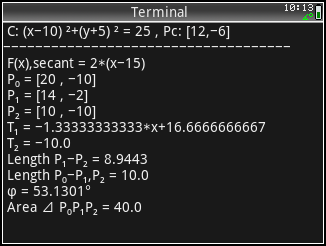
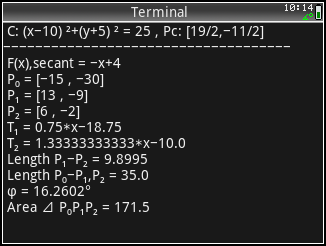
Input CircleTang(10,-5,5,17,-6,0) and press Enter. Result: cf. fig. 1) and fig. 4) .

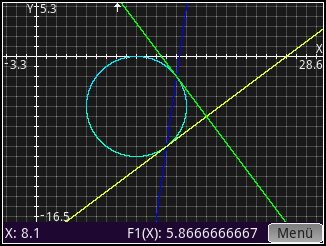
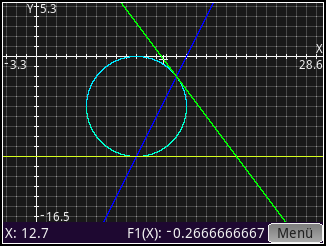
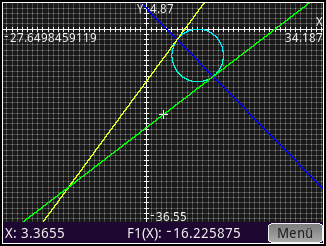
Example to case *II)* Being the same circle given, change the point now to Pc (12,-6):

Input CircleTang(10,-5,5,12,-6,0) and press Enter. Result: cf. fig. 2 and fig. 5 .

Example to case *III)* The same circle as above in combination with f(x) = -x + 4:

Input CircleTang(10,-5,5,-1,4,1) and press Enter. Result: cf. fig. 3 and fig. 6 .

 1)  2)  3)

 4)  5)  6)