

18. A circle passes through the points (7,2) and (7,10). The line $x = -1$ is a tangent to the circle. Find the equation of the circle.

Possible Method

- ① Sub (7,2) into general equation
- ② Sub (7,10) into general equation
- ③ distance from tangent to centre $(-g, -f)$ = Radius

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

$$e.g. \sqrt{g^2 + f^2} = r$$

Solve equations formed from ①, ② and ③ to find values for g, f and c

19. A circle of radius length $\sqrt{20}$ contains the point $(-1, 3)$. Its centre lies on the line $x + y = 0$. Find the equations of the two circles that satisfy these conditions.

Equation $(x-h)^2 + (y-k)^2 = r^2$

Contains $(-1, 3) \Rightarrow (-1-h)^2 + (3-k)^2 = 20$ ①

Centre on $x+y=0$
Sub in (h, k) $h+k=0$ ② $\Rightarrow h = -k$

Solve equations
Sub ② into ①

$$\begin{aligned} (-1+k)^2 + (3-k)^2 &= 20 \\ 1 - 2k + k^2 + 9 - 6k + k^2 &= 20 \\ 2k^2 - 8k - 10 &= 0 \\ k^2 - 4k - 5 &= 0 \\ (k-5)(k+1) &= 0 \\ k=5, k=-1 \end{aligned}$$

Sub k values into ② to get h values

equations :

$$\begin{aligned} S_1: (x+5)^2 + (y-5)^2 &= 20 & c(-5, 5) \\ S_2: (x-1)^2 + (y+1)^2 &= 20 & c(1, -1) \end{aligned}$$