©2001. Kiddy Bolger, Rex Boggs, Rhonda Faragher, John Belward

Exercise 9G – Worked Solutions to the Problems

Hints

1. As $P \rightarrow 100$, $(100 - P) \rightarrow 0$ and hence $C \rightarrow +\infty$. There is a vertical asymptote at $P = 100$.

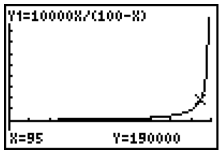
2. First find the coordinates of the centre of the circle, and the radius. Then substitute into the resulting function and solve.

3. Solve simultaneously, using the substitution method.

4. Draw a sketch, and mark on it the coordinates that you know. Recall that the perpendicular bisector of a chord passes through the centre of the circle.

©2001. Kiddy Bolger, Rex Boggs, Rhonda Faragher, John Belward

Exercise 9G – Worked Solutions to the Problems

1. a. 

b. i. $C(10)$ = \$1 111 111 ii. $C(50)$ = \$10 000 000
iii. $C(90)$ = \$90 000 000 iv. $C(99)$ = \$990 000 000
v. $C(99.5)$ = \$1 990 000 000

c. From a graphics calculator, or algebraically, 16.7%.

2. From the graph, the centre of the circle is at (2½, 0) with a radius = 2½. Hence the equation of the circle is:

$$(x-\tfrac{5}{2})^2 + y^2 = \tfrac{25}{4}$$

Substitute 3 for x and t for y, and solve for t:

$$(3-\tfrac{5}{2})^2 + t^2 = \tfrac{25}{4}$$
$$(\tfrac{1}{2})^2 + t^2 = \tfrac{25}{4}$$
$$\tfrac{1}{4} + t^2 = \tfrac{25}{4}$$
$$t^2 = 6$$
$$t = \sqrt{6}$$

3. We have: $y = \dfrac{a}{x}$ (1)

$y = x$ (2)

Substituting (2) into (1) gives:

$$y = \frac{a}{y}$$

So $y^2 = a$

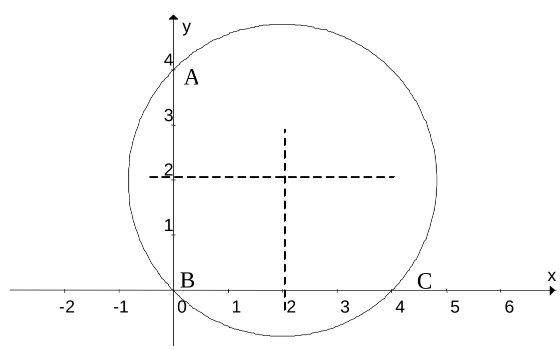
$y = \sqrt{a}$

Since $y = x$

$x = \sqrt{a}$

Hence these functions intersect at $(\sqrt{a}, \sqrt{a})$.

4. The sketch is alongside.



AB and BC are chords of the circle. The dotted lines are perpendicular bisectors of the chords and hence intersect in the centre of the circle.

Therefore the centre of the circle is at (2, 2) and from the distance formula, the radius is $\sqrt{8}$.
Hence the equation of the circle is:

$$(x-2)^2 + (y-2)^2 = 8.$$