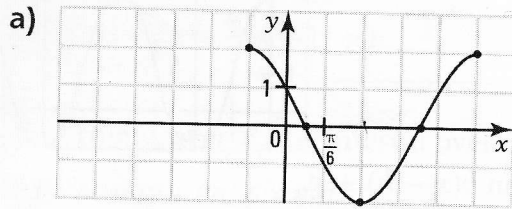
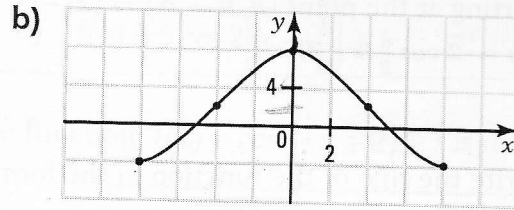


14. Find a rule of the form  $y = a \cos b(x - h) + k$  for each of the following functions.



For example,  $y = 2 \cos 2\left(x + \frac{\pi}{6}\right)$



For example,  $y = -6 \cos \frac{\pi}{8}(x + 8) + 2$

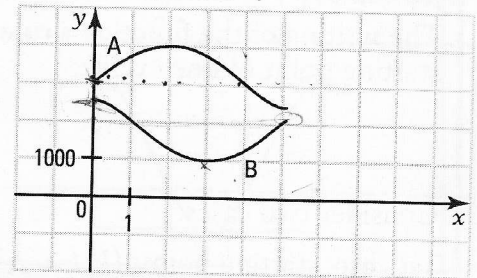
15. The populations of two neighboring villages A and B vary according to the model of a sinusoidal function which gives the population  $P$  of the village as a function of time  $t$ , in years, since the year 2000.

In the year 2000, the two villages had 3000 and 2500 inhabitants respectively.

The graph on the right shows the progression of the population of each village.

Village A reaches its maximum population of 4125 after 2 years and village B reaches its minimal population of 1000 after 3 years.

What will be the difference in population between these two villages in the year 2005?



**Rule corresponding to village A.**

$(h, k) = (0, 3000)$

$A = 1125$

$p = 8 \Rightarrow b = \frac{\pi}{4}$

$y = 1125 \sin \frac{\pi}{4}x + 3000$

In 2005,  $y = 2205$  inhabitants

The difference in their populations will be 80 inhabitants.

**Rule corresponding to village B.**

$(h, k + A) = (0, 2500)$

$A = 750$

$p = 6 \Rightarrow b = \frac{\pi}{3}$

$y = 750 \cos \frac{\pi}{3}x + 1750$

In 2005,  $y = 2125$  inhabitants