

**3.6** Suppose `comm'sz=4` and suppose that  $x$  is a vector with  $n = 14$  components.

- (a) How would the components of  $x$  be distributed among the processes in a program that used a block distribution.
  - (b) How would the components of  $x$  be distributed in a process that used a cyclic distribution?
  - (c) How would the components of  $x$  be distributed among the processes in a program that used a block-cyclic distribution with blocksize  $b = 2$ .
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**3.8** Suppose `comm'sz=8` and  $n = 16$ .

- (a) Draw a diagram that shows how MPI'Scatter can be implemented using tree-structured communication on with `comm'sz` processes when process 0 needs to distribute an array containing  $n$  elements.
  - (b) Draw a diagram that shows how MPI'Gather can be implemented using tree-structured communication when an  $n$ -element array that has been distributed among `comm'sz` processes needs to be gathered into process 0.
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**3.9** Write an MPI program that implements multiplication of a vector by a scalar and dot product. The user should enter two vectors and a scalar, all of which are read in by process 0 and distributed among the processes. The results are calculated and collected onto process 0, which prints them. You can assume that  $n$ , the order of the vectors, is evenly divisible by `comm'sz`.

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