



AP[®] Computer Science A 2003 Sample Student Responses

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(a) An employee is eligible for retirement if (s)he meets at least two of the following requirements:

1. The employee is at least `retireAge` years old.
2. The employee has worked for at least `retireYears`.
3. The employee's salary is at least `retireSalary`.

Write the Company member function `EmployeeIsEligible`, which is described as follows. `EmployeeIsEligible` returns a Boolean value that indicates whether `Employee emp` is eligible for retirement, using the rules described above.

Complete function `EmployeeIsEligible` below.

```

bool Company::EmployeeIsEligible(const Employee & emp) const
// postcondition: returns true if emp is eligible to retire;
//               otherwise, returns false
{
    int x=0;
    if (emp.Age() >= retireAge)
    {
        x++;
    }
    if (emp.YearsOnJob() >= retireYears)
    {
        x++;
    }
    if (emp.Salary() >= retireSalary)
    {
        x++;
    }
    return (x >= 2);
}

```

Part (b) begins on page 10.

GO ON TO THE NEXT PAGE.

- (b) Write the Company member function `ProcessRetirements`, which is described as follows. `ProcessRetirements` removes all retirement-eligible employees from the `empList` array, resizes (shrinks) `empList` as appropriate (maintaining its order by employee ID), and decreases `salaryBudget` to reflect the salary of the remaining employees.

In writing `ProcessRetirements`, you may call `EmployeeIsEligible`, specified in part (a). Assume that `EmployeeIsEligible` works as specified, regardless of what you wrote in part (a).

Complete function `ProcessRetirements` below.

```
void Company::ProcessRetirements()
// postcondition: all retirement-eligible employees have been
//               removed from empList; empList has been resized
//               to reflect retirements;
//               empList remains sorted by employee ID;
//               salaryBudget has been updated to reflect remaining
//               employees
{
    int x, y;

    for (x=0; x < empList.length(); x++)
    {
        if (EmployeeIsEligible (empList[x]))
        {
            for (y=x; y < empList.length()-1; y++)
            {
                empList[y] = empList[y+1];
            }
            empList.resize (empList.length()-1);
            x--;
        }
    }

    salaryBudget = 0;
    for (x=0; x < empList.length(); x++)
    {
        salaryBudget += empList[x].Salary();
    }
}
```

GO ON TO THE NEXT PAGE.

(a) An employee is eligible for retirement if (s)he meets at least two of the following requirements:

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Write the Company member function `EmployeeIsEligible`, which is described as follows.

`EmployeeIsEligible` returns a Boolean value that indicates whether Employee `emp` is eligible for retirement, using the rules described above.

Complete function `EmployeeIsEligible` below.

```
bool Company::EmployeeIsEligible(const Employee & emp) const
// postcondition: returns true if emp is eligible to retire;
//                otherwise, returns false
```

```
{
  if (emp.Age() >= retireAge) {
    if (emp.YearsOnJob() >= retireYears || emp.Salary() >= retireSalary)
      return true;
    else return false;
  }
  if (emp.Salary() >= retireSalary) {
    if (emp.YearsOnJob() >= retireYears || emp.Age() >= retireAge) {
      return true;
    }
    else return false;
  }
  if (emp.YearsOnJob() >= retireYears) {
    if (emp.Salary() >= retireSalary || emp.Age() >= retireAge) {
      return true;
    }
    else return false;
  }
}
```

Part (b) begins on page 10.

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- (b) Write the Company member function `ProcessRetirements`, which is described as follows. `ProcessRetirements` removes all retirement-eligible employees from the `empList` array, resizes (shrinks) `empList` as appropriate (maintaining its order by employee ID), and decreases `salaryBudget` to reflect the salary of the remaining employees.

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Complete function `ProcessRetirements` below.

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//                removed from empList; empList has been resized
//                to reflect retirements;
//                empList remains sorted by employee ID;
//                salaryBudget has been updated to reflect remaining
//                employees
{
    vector<Employee> valid(1);
    int k, j = 0;
    for (k = 0; k < empList.length(); k++) {
        if (!EmployeeIsEligible(empList[k])) {
            valid[j] = empList[k];
            j++;
            valid.resize(j+1);
        }
        else {
            salaryBudget -= empList[k].salary();
        }
    }
    empList = valid;
}

```

GO ON TO THE NEXT PAGE.

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Complete function `EmployeeIsEligible` below.

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bool Company::EmployeeIsEligible(const Employee & emp) const
// postcondition: returns true if emp is eligible to retire;
//                otherwise, returns false
```

↳

```
if((emp.Age() >= retireAge) || (emp.YearsOnJob() >= retireYears) ||
    (emp.Salary() >= retireSalary))
```

↳

```
    return true;
```

↳

```
else
```

↳

```
    return false;
```

↳

↳

Part (b) begins on page 10.

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// postcondition: all retirement-eligible employees have been  
// removed from empList; empList has been resized  
// to reflect retirements;  
// empList remains sorted by employee ID;  
// salaryBudget has been updated to reflect remaining  
// employees  
{
```

```
    for(int x=0; x < empList.length(); x++)  
    {  
        if (EmployeeIsEligible(empList[x]))  
        {  
            salaryBudget = salaryBudget - empList[x].Salary();  
            for(int y=x; y < empList.length()-1; y++)  
            {  
                empList[y] = empList[y+1];  
            }  
            empList.resize(empList.length()-1);  
        }  
    }  
}
```

GO ON TO THE NEXT PAGE.