

1. The hosts of a marathon are using `marathonRunner` objects to store the age and completion time for each runner. The list of all participating marathon runners is kept in a `Marathon` class. The partial declarations for the `marathonRunner` class and `Marathon` class are below:

```
public class marathonRunner
{
    /** Constructs a marathonRunner object with specific age and completion time*/
    Public marathonRunner(int age, double time)
    {/** implementation not shown */}

    /** Returns the runner's age */
    Public int getAge()
    {/** implementation not shown */}

    /** Returns the runner's time in seconds */
    public int getTime()
    {/** implementation not shown */}

    // There may be instance variables, constructors, and methods that are not shown.
}

public class Marathon
{
    /** Constructs a Marathon object with specific ArrayList of marathonRunner objects*/
    Public marathonRunner(ArrayList<marathonRunner> runners)
    {/** implementation not shown */}

    /** Returns the runner's age */
    Public double proportionAge(int lowerAge, int upperAge)
    {/** to be implemented in part (a) */}

    /** Returns the runner's time */
    public double averageSpeed()
    {/** to be implemented in part (b) */}

    // There may be instance variables, constructors, and methods that are not shown.
}
```

(a) The marathon hosts are interested in seeing which age groups are most common or least common among the marathon runners. Write the `Marathon` method `proportionAge`, which returns the proportion of marathon runners with ages within a certain range.

Complete method `proportionAge` below.

```
/** Returns a double representing the proportion of runners in a certain age range
 * @param lowerAge the lower bound in the age range
 * @param upperAge the upper bound in the age range
 * @return the proportion of runners with ages between lowerAge and upperAge
 */
public double proportionAge(int lowerAge, int upperAge)
```

(b) Write the `Marathon` method `averageSpeed`, which calculates and returns the average speed of all of the marathon runners in miles per hour. Recall that speed is equal to distance divided by time, and the length of a marathon is about 26.2 miles.

Complete method `averageSpeed` below.

```
/** Returns a the average running speed for all of the marathon runners
 * @return A double representing the average running speed in miles per hour
 */
public double averageSpeed()
```