AP® Computer Science A
2005 Scoring Guidelines

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2005 A Question 1: Hotel Reservation

Part A: `requestRoom` **4 points**

+1 loop over `rooms`
- **+1/2** attempt (must reference multiple elements of `rooms` in body)
- **+1/2** correct

+1/2 test correct array entry for null (in context of loop)

+1 1/2 handle new reservation (in context of a loop)
- **+1/2** attempt to create new reservation (some sense of `Reservation` construction)
- **+1/2** correctly create reservation (if add to `rooms`, must be in `null` location & assignment correct)
- **+1/2** return reservation (only if `null` entry)

+1 handle wait list after loop or at appropriate time (only if full)
- **+1/2** add new guest to end of `waitlist` only once
- **+1/2** return `null`

Part B: `cancelAndReassign` **5 points**

+1 look up room number
- **+1/2** attempt (must call `res.getRoomNumber()` or use loop to find `res`)
- **+1/2** correct (must call `res.getRoomNumber()`)

+1/2 test `waitlist` to see if empty

+2 1/2 handle nonempty `waitList`
- **+1/2** get *first* entry from `waitList` (only if `waitlist` is not empty)
- **+1/2** create new `Reservation` } *can get these points by*
- **+1/2** assign `Reservation` to correct room } *correctly calling requestRoom*
- **+1/2** remove only first entry from `waitlist` (only if `waitlist` is not empty)
- **+1/2** return new `Reservation` (only if `waitlist` is not empty)

+1 handle empty case
- **+1/2** assign `null` to room (only if `waitList` is empty)
- **+1/2** return `null` (only if `waitList` is empty)

Note: If access using `get` on `rooms` is done more than once, deduct 1/2 usage point, not correctness (ditto for `set` on `rooms`).

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2005 A Question 2: Ticket Sales

Part A: `Advance` **3 1/2 points**

+1/2 `class Advance extends Ticket` (no abstract)

+1/2 private data field (either days or price)

+1 1/2 constructor
- **+1/2** correct header
- **+1** correctly assign data field(s) (lose if reference to super's private data)

+1 `getPrice`
- **+1/2** correct header (must be `public` & `double`, no `abstract`, no parameters)
- **+1/2** return correct price

Part B: `StudentAdvance` **5 1/2 points**

+1/2 `class StudentAdvance extends Advance`

+1 1/2 constructor
- **+1/2** correct header
- **+1/2** attempt to call `super`
- **+1/2** correct call to `super`

+2 `getPrice`
- **+1/2** correct header (must be `public` & `double`, no `abstract`, no parameters)
- **+1** call `super.getPrice()`
- **+1/2** calculate and return correct price

+1 1/2 `toString`
- **+1/2** call `super.toString()`
- **+1** return `string` with correct phrase concatenated (lose this with a reference to super class's private data)

Usage: -1/2 in part A if `super()` appears in the constructor and it is not the first statement executed.

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2005 A Question 3: ZigZag Fish

Part A: `nextLocation` **5 points**

+1/2 determine environment

+1/2 determine current location (lose this if reference inaccessible field)

+1/2 determine current direction (lose this if reference inaccessible field)

+2 determine diagonal locations
- **+1/2** attempt to access any neighbor of current location
- **+1/2** correctly access either forward-diagonal location
- **+1** access correct diagonal (based on `willZigRight`)

+1/2 check contents of diagonal location (`isEmpty`)

+1 return location (in some context of `willZigRight`)
- **+1/2** next location (only if empty)
- **+1/2** current location (only if blocked)

Part B: `move` **4 points**

+1/2 call `nextLocation()`

+1 check if no movement
- **+1/2** attempt
- **+1/2** correct

+1 reverse direction
- **+1/2** attempt
- **+1/2** correct (only if blocked, lose this if reference inaccessible field)

+1 1/2 move and update `willZigRight` (only if not blocked)
- **+1/2** `changeLocation(nextLoc)`
- **+1** correctly update `willZigRight`

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2005 A Question 4: Improving Grades

Part A: `average` **3 points**

+1/2 initialize sum

+1 loop over `scores`
- **+1/2** attempt (must reference `scores` in body)
- **+1/2** correct (from first to last)

+1/2 add score to sum (in context of loop)

+1 calculate and return average
- **+1/2** attempt to calculate average
- **+1/2** return correct value
  (Check for `int` division; must be `double` quotient)

Part B: `hasImproved` **3 points**

+1 loop over `scores`
- **+1/2** attempt (must reference `scores` in body)
- **+1/2** correct (will lose this if index out of bounds)

+1 compare consecutive scores (in context of loop)
- **+1/2** attempt
- **+1/2** correct

+1 return correct `boolean`
- **+1/2** categorize entire array as improved or not improved
  (must be in context of comparing consecutive scores)
- **+1/2** correct value returned

Part C: `finalAverage` **3 points**

+1 call `hasImproved()`
- **+1/2** attempt
- **+1/2** correct

+1 return average of last half
- **+1/2** attempt to average half using `average`
- **+1/2** return correct average (only if improved)

+1 return average of all
- **+1/2** attempt to average all using `average`
- **+1/2** return correct average (only if not improved)

Note: Reimplementing code rather than calling available methods results in score of 0 for the portion of part C related to the code reimplementation.

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Question 1

PART A:

```
public Reservation requestRoom(String guestName)
{
  for (int i = 0; i < rooms.length; i++)
  {
    if (rooms[i] == null)
    {
      rooms[i] = new Reservation(guestName, i);
      return rooms[i];
    }
  }
  waitList.add(guestName);
  return null;
}
```

PART B:

```
public Reservation cancelAndReassign(Reservation res)
{
  int roomNum = res.getRoomNumber();
  if (waitList.isEmpty())
  {
    rooms[roomNum] = null;
  }
  else
  {
    rooms[roomNum] = new Reservation((String)waitList.get(0), roomNum)
    waitlist.remove(0);
  }
  return rooms[roomNum];
}
```

alternate solution

```
public Reservation cancelAndReassign(Reservation res)
{
  int roomNum = res.getRoomNumber();
  rooms[roomNum] = null;
  if (!waitList.isEmpty())
  {
    requestRoom((String)waitlist.get(0));
    waitlist.remove(0);
  }
  return rooms[roomNum];
}
```

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Question 2

PART A:

```
public class Advance extends Ticket
{
  private int daysInAdvance;

  public Advance(int numDays)
  {
    super();
    daysInAdvance = numDays;
  }

  public double getPrice()
  {
    if (daysInAdvance >= 10)
    {
      return 30.0;
    }
    else
    {
      return 40.0;
    }
  }
}
```

OR

```
public class Advance extends Ticket
{
  private double price;

  public Advance(int numDays)
  {
    super();
    if (numDays >= 10)
    {
      price = 30.0;
    }
    else
    {
      price = 40.0;
    }
  }

  public double getPrice()
  {
    return price;
  }
}
```

PART B:

```
public class StudentAdvance extends Advance
{
  public StudentAdvance(int numDays)
  {
    super(numDays);
  }

  public double getPrice()
  {
    return super.getPrice()/2;
  }

  public String toString()
  {
    return super.toString() + "\n(student ID required)";
  }
}
```

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Question 3

PART A:

```
protected Location nextLocation()
{
  Environment env = environment();
  Location loc = location();
  Direction dir = direction();

  Location forward = env.getNeighbor(loc, dir);
  Location nextLoc;
  if (willZigRight)
  {
    nextLoc = env.getNeighbor(forward, dir.toRight());
  }
  else
  {
    nextLoc = env.getNeighbor(forward, dir.toLeft());
  }

  if (env.isEmpty(nextLoc))
  {
    return nextLoc;
  }
  else
  {
    return loc;
  }
}
```

PART B:

```
protected void move()
{
  Location nextLoc = nextLocation();
  if (nextLoc.equals(location())) {
    changeDirection(direction().reverse());
  }
  else
  {
    changeLocation(nextLoc);
    willZigRight = !willZigRight;
  }
}
```

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Question 4

PART A:

```
public double average(int first, int last)
{
  double sum = 0.0;
  for (int i = first; i <= last; i++)
  {
    sum += scores[i];
  }
    return sum/(last-first+1);
}
```

PART B:

```
public boolean hasImproved()
{
  for (int k = 0; k < scores.length-1; k++)
  {
    if (scores[k] > scores[k+1])
    {
      return false;
    }
  }
  return true;
}
```

PART C:

```
public double finalAverage()
{
  if (hasImproved())
  {
    return average(scores.length/2, scores.length-1);
  }
  else
  {
    return average(0, scores.length-1);
  }
}
```