

AP[®] Computer Science A 2009 Scoring Guidelines

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Question 1: Number Cube

| Part (a) | getCubeTosse | es | 4 points | | | |
|----------|--|----------------------|-----------------|-------------------------|--|--|
| | | | | | | |
| +1 | constructs array | | | | | |
| | +1/2 constructs an array of type int or size numTosses | | | | | |
| | +1/2 construc | ts an array of type | int and size | numTosses | | |
| +2 1/2 | processes tosses | | | | | |
| | +1 repeats execution of statements numTosses times | | | | | |
| | +1 tosses cu | be in context of ite | eration | | | |
| | +1/2 collects | results of tosses | | | | |
| +1/2 | returns array of generated results | | | | | |
| Dort (b) | acti ongoath | 22 | 5 noints | | | |
| Tart (D) | gerhongestri | | 5 points | | | |
| +1 | iterates over values | | | | | |
| | +1/2 accesses element of values in context of iteration | | | | | |
| | +1/2 accesses | all elements of val | ues, no out-of- | bounds access potential | | |
| +1 | determines existence of run of consecutive elements | | | | | |
| | +1/2 comparison involving an element of values | | | | | |
| | +1/2 comparison of consecutive elements of values | | | | | |
| +1 | always determines length of at least one run of consecutive elements | | | | | |
| +1 | identifies maximum length run based on all runs | | | | | |
| +1 | return value | | | | | |
| | +1/2 returns starting index of identified maximum length run | | | | | |
| | +1/2 returns -1 | if no run identified | | | | |

Question 2: Stockpile Critter (GridWorld)

- +1 class header
 - +1/2 properly formed class header for StockpileCritter
 - +1/2 extends Critter class

+1 1/2 stockpile state

- +1/2 declares instance variable capable of maintaining state
- +1/2 private visibility
- +1/2 initialization of state appropriate to usage of variable
- +1 overrides methods and maintains all necessary postconditions (*No points awarded if overrides* act *method*)
- +1 processActors overridden (*No points awarded if overrides* act *method*)
- +1 stockpile state maintenance
 - +1/2 accumulates based on number of actors passed to processActors
 - +1/2 decrements appropriately each act
- +1 1/2 removes neighboring actors from grid
 - +1/2 removes at least one neighboring actor from grid
 - +1 removes **all** neighboring actors from grid
- +2 self-removal
 - +1/2 checks status of stockpile by using state variable in a relational expression
 - +1/2 ever removes self from grid
 - +1 removes self from grid when and only when stockpile state indicates empty

Question 3: Battery Charger

| accesses array elements | | | | | |
|---|--|--|--|--|--|
| accesses array elements | | | | | |
| accesses array elements | | | | | |
| +1/2 accesses any element of rateTable | | | | | |
| +1/2 accesses an element of rateTable using an index derived from startHour | | | | | |
| +1/2 accesses multiple elements of rateTable with no out-of-bounds access potential | | | | | |
| accumulates values | | | | | |
| +1/2 declares and initializes an accumulator | | | | | |
| +1/2 accumulates values from elements of rateTable | | | | | |
| $\pm 1/2$ selects values from rateTable using an index derived from | | | | | |
| atartHour and abargoTimo | | | | | |
| determines correct sum of values from the ball a based on | | | | | |
| +1 determines confect sum of values from raterable based on | | | | | |
| startHour and chargeTime | | | | | |
| value returned | | | | | |
| $\pm 1/2$ returns any nonconstant (derived) value | | | | | |
| +1/2 returns any holeonstant (derived) value | | | | | |
| | | | | | |
| getChargeStartTime 4 points | | | | | |
| - | | | | | |

- +1 determines charging cost
 - +1/2 considers all potential start times; must include at least 0 ... 23
 - +1/2 determines charging cost for potential start times

Note: No penalty here for parameter passed to getChargingCost that violates its preconditions (e.g., 24)

- +1 compares charging costs for two different start times
- +1 determines minimum charging cost based on potential start times *Note: Penalty here for using result of call to* getChargingCost *that violates its preconditions (e.g., 24)*
- +1/2 returns start time for minimum charging cost

Question 4: Tile Game

| Part (a) | getIndexForFit 6 points |
|----------|--|
| +1 | empty board +1/2 checks for zero-sized board +1/2 returns 0 if empty board detected |
| +1 | accesses tiles from board +1/2 accesses any tile from board +1/2 accesses all tiles of board (as appropriate) with no out-of-bounds access potential |
| +1 | uses tile values +1/2 accesses left or right value of any tile +1/2 compares left (right) value of parameter with right (left) value of any tile from board |
| +2 | determines tile fit +1/2 only right value of parameter compared with left value of initial tile of board +1/2 only left value of parameter compared with right value of final tile of board +1 compares appropriate values of parameter and interior tiles of board |
| +1 | result +1/2 returns located index if tile fits in board +1/2 returns -1 if tile does not fit in board |
| Part (b) | insertTile 3 points |

- +1/2 invokes getIndexForFit or replicates functionality with no errors
- +1 1/2 tile orientation
 - +1/2 invokes rotate on parameter
 - +1/2 performs all necessary rotations
 - +1/2 invokes getIndexForFit for each necessary orientation
- +1/2 adds tile correctly and only if getIndexForFit returns value other than -1
- +1/2 returns true if getIndexForFit returns value other than -1; false otherwise