COMP ENG 2SI3

Lab 1 - Asymptotic and OOD Analysis

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Asymptotic Analysis

A. `GameMechs::setInitBoard()`

Complexity Type	Associated Complexity	Reasoning
$\Theta(n)$	$\Theta(n^2)$	Nested for-loop, each executing n times (n x n)

B. `objPosArrayList::insertHead()`

Complexity Type	Associated Complexity	Reasoning
$\Theta_{best}(n)$	$\Theta(1)$	n = 0, then the loop doesn't execute
$\Theta_{worst}(n)$	$\Theta(n)$	Loop executes to size n
$O(n)$	$O(n)$	Worst case scenario and upper bound, since $\Theta_{worst}(n)$ is $\Theta(n)$, $O(n)$ is $O(n)$
$o(n)$	$o(n^2)$	$n^2 > n$, so it's bounded by it

C. `objPosArrayList::removeTail()`

Complexity Type	Associated Complexity	Reasoning
$\Theta(n)$	$\Theta(1)$	Each line has $\Theta(1)$ complexity

D. `objPosArrayList::insert()`

Complexity Type	Associated Complexity	Reasoning
$\Theta_{best}(n)$	$\Theta(1)$	Each line has Θ (1) complexity
$\Theta_{worst}(n)$	$\Theta(n)$	Loop executes to size n
O(n)	O(n)	Worst case scenario and upper bound, since $\Theta_{worst}(n)$ is $\Theta(n)$, O(n) is O(n)
o(n)	$o(n^2)$	$n^2 > n$, so it's bounded by it

E. `Player::drawPlayer()`

Complexity Type	Associated Complexity	Reasoning
$\Theta(n)$	Θ (n)	Loop executes to size n

E. `Player::undrawPlayer()`

Complexity Type	Associated Complexity	Reasoning
$\Theta(n)$	Θ (n)	Loop executes to size n

F. `ScreenDrawer::Draw()`

Complexity Type	Associated Complexity	Reasoning
$\Theta(n)$	Θ (n^2)	Nested for-loop

G. `Player::checkSelfCollision()`

Complexity Type	Associated Complexity	Reasoning
$\Theta_{best}(n)$	$\Theta(1)$	Length isn't enough or collision is detected early
$\Theta_{worst}(n)$	$\Theta(n)$	Entire for-loop executes
$O(n)$	$O(n)$	Worst case scenario and upper bound, since $\Theta_{worst}(n)$ is $\Theta(n)$, $O(n)$ is $O(n)$
$o(n)$	$o(n^2)$	$n^2 > n$, so it's bounded by it

H. `Player::movePlayer()`

Complexity Type	Associated Complexity	Reasoning
$O(n)$	$O(n)$	All lines are $\Theta(1)$, and undrawPlayer() has a complexity off $\Theta(n)$

I. `ItemBin::generateItem()`

Complexity Type	Associated Complexity	Reasoning
$\Omega(n)$	$\Omega(n^2)$	Nested for-loops