

Week 4 Submission

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For this week's submission I worked with Joshua Vazzoler and Katrina David

Question one

Assume the trajectory set is {1, -1, 1, 3}, maxLevel = 5

Loop: for(int i = s.length-1; i >= 0; i--)

Variables:

InitialLevel: the amount of energy the rover begins with.

maxLevel: the maximum energy capacity.

Loop invariant:

- InitialLevel never exceed maxLevel throughout the trajectory of the rover, i.e. $\text{maxLevel} \geq \text{InitialLevel}$.

Relevance to loop's goal: With a negative trajectory value, the absolute value of the negative trajectory is added to the energy value (within the constraints of the maxLevel). A positive trajectory value that exceeds the current energy level will require the InitialLevel to be increased. If at any time the InitialLevel exceeds maxLevel then we are unable to complete the trajectory.

Initialisation:

The loop invariant is true before the first iteration of the loop.

Before the first iteration of this loop, maxLevel is equal to 5 and InitialLevel is equal to 0.

Therefore, $\text{maxLevel} \geq \text{InitialLevel}$, loop invariant holds true.

Maintenance:

If the loop invariant is true at the start of one iteration of the loop, then it is also true at the start of the next iteration.

At the beginning of the 2nd iteration of the loop, InitialLevel = 3 \leq maxLevel. At the beginning of the 3rd iteration, InitialLevel = 4 \leq maxLevel.

Assume the 2nd iteration is iteration k, and the 3rd iteration is iteration k+1.

This is the induction step and we have proved the loop invariant is true at the start of iteration k = 2, as well as k+1.

Termination:

At the very end of the loop, InitialLevel = 4 \leq maxLevel

Here we can see that the loop invariant has held true through the completion of the algorithm with the InitialLevel value being 4.

Question Two

a. How many actors/directors have been in at least 10 movies?

246 Actors.

b. How many actors/directors have been in at least 35 movies? List them.

Bruce Willis=[16 Blocks , A Good Day to Die Hard , Armageddon , Bandits , Beavis and Butt-Head Do America , Breakfast of Champions , Cop Out , Death Becomes Her , Die Hard , Die Hard 2 , Die Hard with a Vengeance , Hart's War , Hostage , Hudson Hawk , Live Free or Die Hard , Looper , Lucky Number Slevin , Mercury Rising , Moonrise Kingdom , Over the Hedge , Pulp Fiction , RED , RED 2 , Sin City: A Dame to Kill For , Surrogates , Tears of the Sun , The Cold Light of Day , The Expendables 2 , The Fifth Element , The Jackal , The Kid , The Prince , The Siege , The Sixth Sense , The Story of Us , The Whole Nine Yards , The Whole Ten Yards , Unbreakable]

Johnny Depp=[A Nightmare on Elm Street , Alice Through the Looking Glass , Alice in Wonderland , Black Mass , Blow , Charlie and the Chocolate Factory , Corpse Bride , Dark Shadows , Don Juan DeMarco , Donnie Brasco , Ed Wood , Edward Scissorhands , Fear and Loathing in Las Vegas , Finding Neverland , Freddy's Dead: The Final Nightmare , From Hell , Into the Woods , Mortdecai , Once Upon a Time in Mexico , Pirates of the Caribbean: At World's End , Pirates of the Caribbean: Dead Man's Chest , Pirates of the Caribbean: On Stranger Tides , Pirates of the Caribbean: The Curse of the Black Pearl , Platoon , Public Enemies , Rango , Secret Window , The Astronaut's Wife , The Libertine , The Lone Ranger , The Ninth Gate , The Tourist , Transcendence , Tusk , What's Eating Gilbert Grape , Yoga Hosers]

Matt Damon=[All the Pretty Horses , Chasing Amy , Contagion , Courage Under Fire , Dogma , Elysium , EuroTrip , Gerry , Good Will Hunting , Green Zone , Hereafter , Inside Job , Invictus , Jason Bourne , Margaret , Ocean's Thirteen , Promised Land , Rounders , Saving Private Ryan , Spirit: Stallion of the Cimarron , Stuck on You , Syriana , The Adjustment Bureau , The Bourne Identity , The Bourne Supremacy , The Bourne Ultimatum , The Brothers Grimm , The Departed , The Informant! , The Legend of Bagger Vance , The Martian , The Monuments Men , The Rainmaker , The Talented Mr. Ripley , Titan A.E. , True Grit , We Bought a Zoo]

Morgan Freeman=[Along Came a Spider , Amistad , An Unfinished Life , Batman Begins , Ben-Hur , Bruce Almighty , Chain Reaction , Deep Impact , Dolphin Tale , Dolphin Tale 2 , Dreamcatcher , Driving Miss Daisy , Evan Almighty , Glory , Hard Rain , High Crimes , Invictus , Kiss the Girls , Last Vegas , Lucky Number Slevin , Lucy , March of the Penguins , Million Dollar Baby , Now You See Me , Now You See Me 2 , Nurse Betty , Oblivion , Olympus Has Fallen , Outbreak , RED , Robin Hood: Prince of Thieves , Se7en , Ted 2 , The Big Bounce , The Bucket List , The Dark Knight , The Lego Movie , The Shawshank Redemption , The Sum of All Fears , Transcendence , Unforgiven , Unleashed , Wanted]

Robert De Niro=[15 Minutes , Analyze That , Analyze This , Brazil , Cape Fear , Casino , City by the Sea , Cop Land , Dirty Grandpa , Everybody's Fine , Flawless , Godsend , Goodfellas , Grudge Match , Hands of Stone , Heist , Hide and Seek , Jackie Brown , Joy , Killer Elite , Last Vegas , Little Fockers , Machete , Marvin's Room , Mean Streets , Meet the Fockers , Meet the Parents , Men of Honor , Midnight Run , New Year's Eve , New York, New York , Once Upon a Time in America , Raging Bull , Red Lights , Righteous Kill , Ronin , Shark Tale , Silver Linings Playbook , Sleepers , Stone , Taxi Driver ,

The Adventures of Rocky & Bullwinkle , The Big Wedding , The Bridge of San Luis Rey , The Deer Hunter , The Fan , The Godfather: Part II , The Intern , The Score , The Untouchables , Wag the Dog , We're No Angels , What Just Happened]

Steve Buscemi=[28 Days , Armageddon , Big Daddy , Big Fish , Charlotte's Web , Con Air , Desperado , Domestic Disturbance , Ed and His Dead Mother , Escape from L.A. , Final Fantasy: The Spirits Within , Ghost World , Grown Ups , Grown Ups 2 , Home on the Range , Hotel Transylvania , Hotel Transylvania 2 , I Think I Love My Wife , Kansas City , Khumba , Lonesome Jim , Monster House , Monsters University , Monsters, Inc. , Mr. Deeds , Paris, je t'aime , Reservoir Dogs , Romance & Cigarettes , Saint John of Las Vegas , Spy Kids 2: Island of Lost Dreams , The Big Lebowski , The Incredible Burt Wonderstone , The Island , The Messenger , Things to Do in Denver When You're Dead , Trees Lounge , Youth in Revolt]

c. How many movies has Brad Pitt been in? (Hint: it is more than 30).

Brad Pitt has been in 33 films.

d. How many movies has Natalie Portman been in? List them.

Natalie Portman has been in 19 films.

[Anywhere But Here , Black Swan , Brothers , Closer , Cold Mountain , Hesh , Jane Got a Gun , Mars Attacks! , My Blueberry Nights , No Strings Attached , Star Wars: Episode I - The Phantom Menace , Star Wars: Episode II - Attack of the Clones , Star Wars: Episode III - Revenge of the Sith , The Other Boleyn Girl , Thor , Thor: The Dark World , V for Vendetta , Where the Heart Is , Your Highness]

e. How many movies has Michael Bay been in? List them.

Michael Bay has been in 12 films.

[13 Hours , Armageddon , Bad Boys , Bad Boys II , Pain & Gain , Pearl Harbor , The Island , The Rock , Transformers , Transformers: Age of Extinction , Transformers: Dark of the Moon , Transformers: Revenge of the Fallen]

f. Which actor/director have been in the most number of movies? How many movies has he or she been in?

Robert De Niro, and he has been in 53.