UC Berkeley's CS10 Fall 2016 Midterm 1 : Instructor Dan Garcia

Your Name (first last) | *SID* | *Lab TA's Name*

← *Name of person on left (or aisle)* | *Name of person on right (or aisle)* →

What's that Smell? Oh, it's Potpourri! (2 pts each for 1-6, low score dropped)

Fill in the correct circles & squares completely…like this: ● (select ONE) ■ (select ALL that apply)

Question 1: What happened in 2005 that *caused computer chip manufacturers to "go parallel"*? (select ONE)
○ Computer chip power density started approaching that of a nuclear reactor and we couldn't cool them down.
○ Researchers discovered new algorithms that worked incredibly faster on parallel computers.
○ Threads were invented that allowed the same algorithm to be split into parallel sub-parts automatically.
○ It became cheaper to build chips with parallel components inside than non-parallel (serial) components.

Question 2: Consider the AI problem of *Natural Language Processing* of an audio track in which the user says the two words: "artificial <audio-garbled>". The three most common words the user could have wanted to say next are "intelligence", "limb" and "flavoring". The system chooses the one… (select ONE)
○ that most often occurs after "artificial" in spoken English based on transcriptions (known as n-grams).
○ based on the proximity of the garbled audio track to audio recordings of each of the three words.
○ with the highest SUM of the n-gram probability and the audio proximity probability.
○ with the highest PRODUCT of the n-gram probability and the audio proximity probability.

Question 3: Sir Ken Robinson, the famed British author and speaker argues… (select ALL that apply)
☐ we shouldn't be "anesthetizing" our students (with ADHD medicines), we should be "waking them up"!
☐ we've got to go in a completely separate direction from standardization and standardized curriculums.
☐ we should be separating male students from female students so they can each focus better.
☐ most great learning happens *individually*, which is the "stuff of growth".

Question 4: What are examples of the principle: "Information about you on the internet will be used by somebody in their interest — including against you"… (select ALL that apply)
☐ Hackers stealing your personal information for identity theft.
☐ Hackers stealing your private information for extortion.
☐ Advertisers using your web browsing habits to show you online custom ads.
☐ Data brokers selling information about you to offline advertisers.

Question 5: What is *Stuxnet*? (select ONE)
○ An American data collection program, revealed by Edward Snowden.
○ A network of computers used to induce a "denial of service" attack, when commanded.
○ A computer worm used to spin Iranian uranium enrichment centrifuges out of control.
○ The China-US cyber espionage agreement.

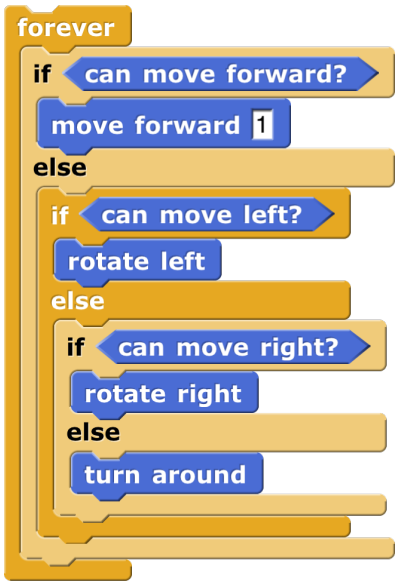
Question 6: Octal (base 8) is another base that computer professionals sometime use to represent numbers. How many different things can be represented by two octal characters, with each character 0-7? (select ONE)

○	○	○	○
8	16	64	88

Question 7,8: どうもありがとうミスターロボット ***Dōmo arigatō, Mr. Roboto…*** (4,2 pts) SID: _____

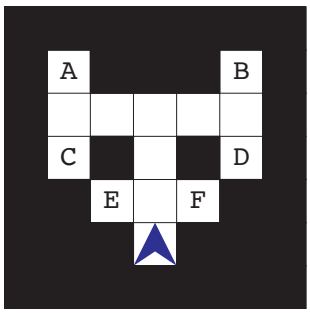
Here are helper blocks for control and sensing of a robot, starting in the bottom center of the grid, facing up.

move forward	rotate left rotate right turn around	can move left? can move forward? can move right?
The robot moves *INPUT squares* forward in the direction it's facing.	The robot turns, in-place. {left = counterclockwise, right = clockwise, around = u-turn}	Reports `true` if the robot has a free square to its {left, front, right}; otherwise reports false.



Which letters are reached if we run the script? (select ALL that apply)

☐ A	☐ B	☐ C	☐ D	☐ E	☐ F



If we swap the cases for testing and going LEFT with the cases for testing and going RIGHT, how does the # of letters we reach change? (select ONE)

○ Increases	○ Decreases	○ Remains same

Question 9,10,11: Beethoven was a tremendous composer… (14 pts = 1+4+9)

Consider the following blocks that operate on lowercase words, with example calls shown:

Block	Description	Examples
spin1st ☐	Spins the 1st character forward one letter, stopping at "z". So "a" → "b", "b" → "c", …, "y" → "z", and "z" → "z"	spin1st abcd → bbcd spin1st zbcd → zbcd
spin1st of right ☐	Removes the last letter and puts it at the front, so it looks like we've "rotated" the letters to the right THEN spins the first letter one letter, stopping at "z".	spin1st of right abcd → eabc spin1st of right xyz → zxy

What is spin1st of right spin1st darsa? (select ONE)
(here's the alphabet if that helps: `abcdefghijklmnopqrstuvwxyz`)

○ asrad	○ bears	○ arsaf	○ bfars

Imagine a series of these blocks (possibly very many) composed together. If the *output* of this composed expression were "**treat**", which of the following could have been the *input*? (select ALL that apply)

☐ beats	☐ reatt	☐ aaaaa	☐ ataaa

Wouldn't it be great if a predicate existed to tell us whether a *particular* input **word** (say one of the four above), sent through an arbitrary composed expression of these two blocks could ever produce an output **goal** word? In some sense, we think of it as asking whether we can get from **word** to **goal**. Let's write it together! (Select ONE bubble in *each of the 6 rows* to complete the block correctly.)