**A blue and yellow logo

Description automatically generated with low confidence San Francisco Bay University**

**Lab 5 Basic Programming Questions in C Language**

**Due day: 2/16/2023**

**Instruction:**

1. **Push the source code to Github or piazza platform.**
2. **Please follow the code style rule like programs on handout.**
3. **Overdue homework submission could not be accepted.**

**4. Takes academic honesty and integrity seriously (Zero Tolerance of Cheating & Plagiarism)**

1. There is a kind of bacterium with two sub-species A and B. They are very similar and difficult to differentiate, but the major difference between them is capability of reproduction. And reproduction in A is much stronger than that of B. Assuming that in a research center, researcher massed up Petri dishes with A and B bacterium, write a program to find which one is A, and which one is B in terms of each reproduction rate, given that reproduction rate is the ratio of new number of bacteria to original number after one hour (PR = new bacterial number / original bacterial numbers). Because of the huge different reproduction rate, it means that the difference of PR in any two Petri dishes belonging to the same sub-species is extremely smaller than that in any two Petri dishes belonging to the different sub-species.

*Output*

*Enter total number of Petri dishes: 5*

*Enter Petri dish label, original bacterial number, new bacterial number after one hour reproduction:*

*1 10 3456*

*2 10 5644*

*3 10 4566*

*4 20 234*

*5 20 232*

*Running results:*

*3 in A* sub-species *and Petri dish labels from smaller PR to bigger PR are 1 3 2*

*2 in B* sub-species *and Petri dish labels from smaller PR to bigger PR are 5 4*

1. Find the absolute value of maximum odd number minus minimum even number from standard input device by a program.

*Output*

*Enter a series of integer numbers: 1 2 3 4 5 6*

*Result is: 3 // |5 - 2| =3*

*Enter a series of integer numbers: 1 6 3 8 5 10*

*Result is: 1 // |5 – 6| =1*

1. A group of monkeys want to elect a king based on the following rules.

a. everyone is sitting in a circle and get number in clockwise direction from 0 to *n-1*

b. with a given number *m* that is set up before, count each one in clockwise direction from *1* to *m*, and then monkey will be out from the competition.

c. after that, re-assign number right after monkey for each from 0 to *n-2*

d. repeat above step b and c until the last one is left. And it will be the king.

e. the program running result should be king’s number in step a

*Output*

*Enter total number of monkeys in a group: 5*

*Enter m value: 3*

*The king will be 3*

*Enter total number of monkeys in a group: 8*

*Enter m value: 5*

*The king will be 2*

1. Write a program to calculate minimum number of bills for a given payment assuming existing bills, such as *$100, $50, $20, $10, $5* and *$1*

*Output*

*Enter total payment: 735*

*Result of minimum number of bills: 10*

*$100 bill: 7*

*$50 bill: 0*

*$20 bill: 1*

*$10 bill: 1*

*$5 bill: 1*

*$1 bill: 0*

1. There are 4 types of racing sport cars with number from *1* to *4*. And *4* car-design experts will review them and give 4 answers as follows.
   1. expert A said: #2 is the best.
   2. expert B said: #4 is the best.
   3. expert C said: #3 is NOT the best.
   4. expert D said: expert B is wrong.

Actually, only car is the best, and one & only one expert review is correct, the others are wrong. Write a program to calculate and print on the monitor which car is the best and which expert review is correct.

1. Given a CT scanning image file saved as 2-dementional array, each element in array denotes one cell with different value from 0 to 255. Assuming that malignant cell’s value is less 50 than around 4 cells (up, down, left, right), and the cell on the matrix edge will NOT be detected, write a program to calculate and print number of malignant cells.

*Output*

*Enter size of row & column: 4 4*

*Enter each element:*

*70 70 70 70*

*70 10 70 70*

*70 70 20 70*

*70 70 70 70*

*Result of malignant cell detection: 2*