

Unit 02 Free-Response Question (FRQ)

Consider the following description of the `LightSequence` class which includes one constructor and three methods.

- `public LightSequence(String seq)` – Constructs a `LightSequence` object with an initial sequence `seq` to use for the light display.
- `public String insertSegment(String segment, int ind)` – Inserts the string `segment` in the current sequence, starting at the index `ind`. Returns the new sequence.
- `public void changeSequence(String seq)` – updates the sequence to the value in `seq`.
- `public void display()` - uses the current sequence to turn the light on and off for the show.

- a) Write a statement to create a `LightSequence` object `gradShow` that has the initial light sequence “0101 0101 0101”. Write the statement in the box below.

```
LightSequence gradShow =  
    new LightSequence("0101 0101 0101");
```

- b) Write a statement that will call the `display` method to display the light sequence for the `gradShow` object. Write the statement in the box below.

```
gradShow.display();
```

- c) Write a statement that will be used to update the `gradShow` light sequence to “0011 0011 0011”. Write the statement in the box below.

```
gradShow.changeSequence("0011 0011 0011");
```

- d) Write a code segment that will call the `insertSegment` method to insert the segment “1111 1111” in the current sequence for `gradShow` at index 4. The resulting sequence will be stored in the string `resultSeq`. Write the code segment in the box below.

```
String resultSeq =  
    gradShow.insertSegment("1111 1111", 4);
```

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e) Assume that `oldSeq` is an object of type `String` and has been properly declared and initialized and contains a string segment. Write a code segment that will remove the first occurrence of `segment` from `oldSeq` and store it in the string `newSeq`. Consider the examples.

- If `oldSeq` is “1100000111” and `segment` is “11”, then “00000111” should be stored in `newSeq`.
- If `oldSeq` is “0000011” and `segment` is “11”, then “00000” should be stored in `newSeq`.
- If `oldSeq` is “1100000111” and `segment` is “00”, then “11000111” should be stored in `newSeq`.

Write the code segment in the box below. Your code segment should meet all the specifications and conform to the examples.

```
int index = oldSeq.indexOf(segment);
String newSeq =
    oldSeq.substring(0, index) +
    oldSeq.substring(index+segmentLength());
```

f) Two lights will be arranged on a two-dimensional plane. The vertical distance between the two lights is stored in the `double` variable `a`. The horizontal distance between the two lights is stored in the `double` variable `b`. The straight-line distance between the two lights is given by the formula $\sqrt{a^2 + b^2}$.

Write a code segment that prints the straight-line distance between the two lights according to the formula above.

```
System.out.println(
    Math.sqrt(Math.pow(a, 2)+Math.pow(b, 2)));
```