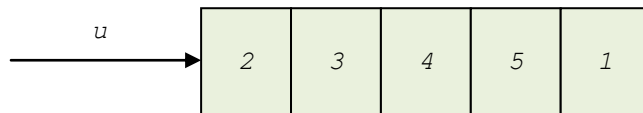


Exam – required part: solution

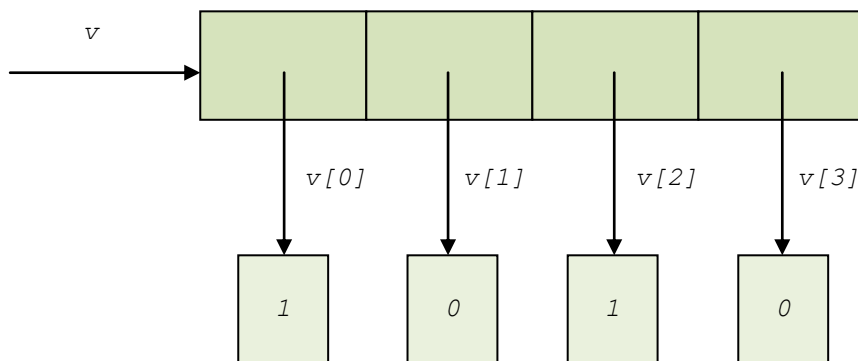
Tasks: solutions

Task 1 (2 points + 2 points)

a) (2 points)



b) (2 points)



Task 2 (2 poäng + 2 poäng + 2 poäng)

```
public class Math
{
    public static byte signum (double x)
    {
        byte    sig = 0;
        if (x < 0)
            sig = -1;
        else if (x > 0)
            sig = 1;

        return sig;
    }

    public static double abs (double x)
    {
        return (x < 0)? -x : x;
    }

    public static long floor (double x)
    {
        long    k = (long) x;
    }
}
```

```

        return (k > x)? k - 1 : k;
    }
}

```

Task 3 (3 points + 4 points)

a) (3 points)

```

public static Word[] merge (Word[] words1, Word[] words2)
{
    // an array to hold all the given words
    Word[] words = new Word[words1.length + words2.length];
    int pos = 0;
    for (Word word : words1)
        words[pos++] = word;
    for (Word word : words2)
        words[pos++] = word;

    return words;
}

```

b) (4 points)

```

Word[] words1 = { new Word ("ett", "one"),
                  new Word ("två", "two"),
                  new Word ("tre", "three"),
                  new Word ("fyra", "four"),
                };
Word[] words2 = { new Word ("fem", "five"),
                  new Word ("sex", "six"),
                  new Word ("sju", "seven"),
                  new Word ("åtta", "eight"),
                };

Word[] words = merge (words1, words2);
for (Word word : words)
    System.out.println (word);

```

Task 4 (2 points + 3 points + 2 points + 1 point)

a) (2 points)

```

public StringCreator (char[] chars)
{
    this.chars = new char[chars.length + 1];

    // copy characters
    for (int pos = 0; pos < chars.length; pos++)
        this.chars[pos] = chars[pos];

    // adjust the charCount variable
    charCount = chars.length;
}

```

b) (3 points)

```

public void insert (char c, int pos)
    throws ArrayIndexOutOfBoundsException
{
    if (pos > charCount)
        throw new ArrayIndexOutOfBoundsException ("bad index: " + pos);

    for (int p = charCount - 1; p >= pos; p--)

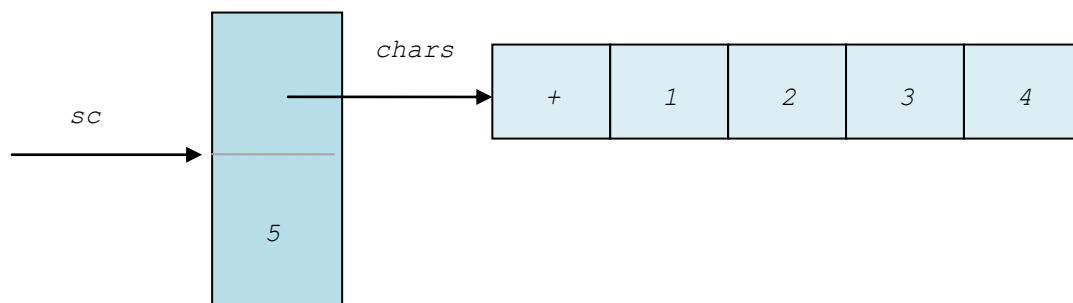
```

```

        chars[p + 1] = chars[p];
        this.chars[pos] = c;
        charCount++;
    }

```

c) (2 points)



d) (1 point)

An exception of type `java.lang.ArrayIndexOutOfBoundsException` is thrown by method `insert`. The supplied position is not allowed:

```
java.lang.ArrayIndexOutOfBoundsException: bad index: 5
```

Task 5 (4 points + 2 points + 2 points)

a) (4 points)

```

// toString returns the string representation of the circle
public String toString ()
{
    StringBuilder sb = new StringBuilder ("[" );
    sb.append (this.getColour () + " | ");
    sb.append ("(" + this.radius + ")");
    sb.append ("]");

    return sb.toString ();
}

// area returns the area of the circle
public double area ()
{
    return this.radius * this.radius * java.lang.Math.PI;
}

```

b) (2 points)

If statement (1) is included, a compilation error occurs. The reference `shapes[0]` is of type `Shape`. Accordingly, this reference can only refer to objects that are subclasses of class `Shape` (for example objects of type `Rectangle` and objects of type `Circle`). It cannot refer to objects of class `java.lang.String`; this class is not a subclass to class `Shape` (it is a direct subclass to the class `java.lang.Object`).

c) (2 points)

