PFI 2019 Ordinary exam answers

Question 1

a) ThreeDPoint depends on Point. [1 mark]
b) Point is the superclass of ThreeDPoint. [1 mark]
c) ThreeDPoint is a specialization of Point. [1 mark]
d) The toString and getR methods in ThreeDPoint override the implementations in Point. [1 mark for either correct example]
e) getX, getY, getZ, getR, getPhi, toString, getTheta. [2 marks]
f) x, y, getR, getTheta, getX, getY, toString. [2 marks]
g) No. [1 mark]
h) No. [1 mark]

Question 2

```
4 2 1 3 5 9 8 7 6 4
```

[10 marks, 1 mark for each correct number in the correct position]

Question 3

a) List [1 mark]
b) add, remove [1 mark]
c) PointList and Point, Point is contained in PointList [2 marks]
d) List and ArrayList, List is the superclass of ArrayList [2 marks]
e) List implements Collection. [2 marks]
f) PointList, Point and ArrayList [2 marks]

Question 4

```
1 2
3 3
4 0
1 0 1
0 1 null
```

[10 marks, 2 marks for each correct line]

Question 5

```
3 2
6 8
15 30
12 8
10 20
```

[10 marks, 1 for each correct number in the output]

Question 6

a)

```
1: I'm a very odd widget!
2: I'm a very even widget!
3: I'm a very odd widget!
4: I'm a very even widget!
```

[4 marks, 1 mark for each correct line]

b) The program would not compile because there would be an error in line 9 – cannot call a non-static method from a static context. [2 marks]

c)

```
1: I'm a very odd widget!
1: I'm a very odd widget!
1: I'm a very odd widget!
1: I'm a very odd widget!
```

[2 marks]

d)

```
0: I'm a very even widget!
1: I'm a very odd widget!
2: I'm a very even widget!
3: I'm a very odd widget!
```

[2 marks]

Question 7

a) Any three sequences of three numbers, separated by spaces, where the first one is 5 or 0, the second is 7 or zero and the third is 9 or zero. That is, any three of the following:

0 0 0
5 0 0
0 7 0
0 0 9
5 7 0
5 0 9
0 7 9
5 7 9

[6 marks, 2 for each output]

b) The following line needs to be inserted:

```
18              Thread.sleep(delay);
19              for (Thread th : threads) th.join();
20          } catch (InterruptedException e) {
```

Output is always 5 7 9

[4 marks]

Question 8

a) Q8Server [1 mark]

b)

```
Q8Client [Java A
2 3
sum: 5.0
```

nothing printed to Q8Server console.
[4 marks]

c) 127.0.0.1:50000 [2 marks]
d) The input stream is a stream of bytes. The InputStreamReader converts the bytes into characters. The BufferedReader allows the stream of characters to be read efficiently (e.g., a line at a time). [2 marks]
e) line 29 of Q8Server. [1 mark]

Question 9

a) line 24, implicit [1 mark]
b) onCreate [1 mark]
c) It is used to identify the intent received by onActivityResult as being in response to the call to startActivityForResult in line 26. [2 marks]
d) i. The Button object. [1 mark];
ii. It defines the resource id of the button which is stored in the R.java file. The "@id/" component defines the value to be an id and the "+" indicates that this is the first time that the id is defined and that it should therefore be added to the R.java file. [2 marks]
e) A Bundle is an associative array used to store arbitrary data as key—value pairs. The key is a string and the value is always a byte array. The Bundle object is used in lines 32-33 of onActivityResult to store the bitmap returned by the camera in the Intent. [2 marks]
f) Because the lhs variable has type Bitmap and the get method returns a raw byte array.
[1 mark]

Question 10

a) Activity enters paused state when no longer in use and becomes killable. Unregister any sensor listeners to conserve power and to ensure that all housekeeping has been done in the case that the activity is killed, otherwise the sensors continue to send readings.
b) Because onResume is the earliest lifecycle callback that is certain to run after a call to onPause if the app again becomes visible and returns from paused state.
c) line 30
d) slowest, in order to conserve power
e) The MainActivity object.

[2 marks for each correct part]