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MEMORANDUM

CONFIDENTIAL

SEMESTER TEST 1 <input checked="" type="checkbox"/>	SEMESTERT TEST 2 <input type="checkbox"/>	Sick Test <input type="checkbox"/>
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SUBJECT CODE:	MOB/MMD316D
SUBJECT NAME:	Mobile Computing
EXAMINATION DATE: (For Office Use Only)	

Contact person(s) to collect the scripts

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Instructions

- All answers should be submitted on EC.
- EC test number for this exam is: **A**
- Subject Code: **MOB/MMD316D** Intake: **20241** Test Number: **A**
- Make sure to submit all your answers on EC before the time expires. **You will not be allowed to submit if the time runs out.**

Detailed EC Instructions

Open <http://ec.tut.ac.za> in browser

Login using your Student Number and Password

Click [Student] -> [Tests] -> [Web Test 4]

Enter the Subject Code: **MOB/MMD316D**

Enter the Intake: **20241**

Enter the Test Number: **A**

Click Write

Click Start

In the Sections View Click [GO]

Find the Question Number to Answer Click [GO]

Type / Select your answer

Click Go Button to save the answer

Click the [View] link next to the question to verify it was submitted.

FOR PRACTICAL QUESTIONS - TYPE YOUR ANSWERS IN A TEXT EDITOR FIRST, THEN COPY TO EC. THIS WAY YOU WILL HAVE AN AUTOMATIC BACKUP.

– START –

This assessment has 6 questions, for a total of 70 points.

Each Question will start on a new page.

Question 1 _____(10)

Provide your answer by selecting Question number 1 and selecting the answer under the corresponding EC sub question number.

(1.1) What is the purpose of the main function in a Kotlin program? [1]

- A. To define the program's entry point
- B. To handle user input
- C. To display messages to the user
- D. To declare variables

Memo: A - To define the program's entry point

(1.2) What is the purpose of the println() function in Kotlin? [1]

- A. To read input from the user
- B. To perform mathematical calculations
- C. To print text to the standard output
- D. To define a new function

Memo: C - To print text to the standard output

(1.3) Which of the following statements is true about Kotlin function names? [1]

- A. Function names should start with an uppercase letter.
- B. Function names should be in camel case.
- C. Function names should be separated by spaces.
- D. Function names should be nouns.

Memo: B - Function names should be in camel case.

(1.4) What is the purpose of defining separate functions for specific tasks? [1]

- A. To make the code longer and more complex
- B. To slow down program execution
- C. To create reusable and readable code
- D. To confuse other developers

Memo: C - To create reusable and readable code

(1.5) Which keyword is used for declaring or defining a function in programming languages such as Kotlin or Swift? [1]

- A. def
- B. function
- C. fun
- D. proc

Memo: C - fun

(1.6) What is the default return type for a function when not explicitly specified in Kotlin [1]

- A. null
- B. void
- C. NONE
- D. Unit

Memo: D - Unit

(1.7) What keyword is used to define a new variable in Kotlin? [1]

- A. var
- B. val
- C. let
- D. int

Memo: B - val

(1.8) In Kotlin, what symbol precedes a variable name within a string template? [1]

- A. #
- B. \$
- C. @
- D. &

Memo: B - \$

(1.9) Which of the following is a relevant style guide recommendation for the placement of the opening curly brace in Kotlin? [1]

- A. It should appear on its own line.
- B. It should appear at the end of the line where the function begins.
- C. It should appear after a space on the same line as the function declaration.
- D. It should appear before the function declaration.

Memo: B - It should appear at the end of the line where the function begins.

(1.10) What feature allows you to specify parameter names when calling a function in Kotlin? [1]

- A. Named parameters
- B. Parameter identifiers
- C. Argument labels
- D. Named arguments

Memo: D - Named arguments

Question 2 _____(10)

Provide your answer by selecting Question number 2 and selecting the answer under the corresponding EC sub question number.

(2.1) Which IDE serves as the foundation for Android Studio? [1]

- A. Eclipse
- B. NetBeans
- C. IntelliJ IDEA
- D. Visual Studio

Memo: C - IntelliJ IDEA

(2.2) What does a project template provide in Android Studio? [1]

- A. Starter code and project structure
- B. A list of dependencies
- C. Pre installed plugins
- D. Sample data for testing

Memo: A - Starter code and project structure

(2.3) In Android Studio, what is the function of the Project tab? [1]

- A. It displays the layout of the app interface.
- B. It provides a list of dependencies for the project.
- C. It shows the files and folders of the project.
- D. It offers debugging tools for testing the app.

Memo: C - It shows the files and folders of the project.

(2.4) In Android app development, which function serves as the entry point to the app and is responsible for building the user interface? [1]

- A. onStart
- B. onResume
- C. onCreate
- D. onRestart

Memo: C - onCreate

(2.5) What purpose does the Composable annotation serve in Jetpack Compose? [1]

- A. It signals to the Kotlin compiler that the function generates UI.
- B. It marks a function as the entry point to the app.
- C. It indicates that a function is used to set the content of the UI.
- D. It specifies that a function is used for handling user interactions.

Memo: A - It signals to the Kotlin compiler that the function generates UI.

(2.6) Which of the following statements accurately describes a composable function in Jetpack Compose? [1]

- A. It must have a return type specified.
- B. Its name must start with a lowercase letter.
- C. It cannot accept parameters.
- D. It cannot return anything.

Memo: D - It cannot return anything.

(2.7) What is a Surface used for in Jetpack Compose? [1]

- A. It is a container for UI elements.
- B. It represents a section of UI where appearance can be altered.
- C. It provides animation effects.
- D. It defines the layout structure of the app.

Memo: B - It represents a section of UI where appearance can be altered.

(2.8) What is an Android Virtual Device (AVD) used for in Android development? [1]

- A. It is a physical device used for testing apps.
- B. It is a virtual representation of a mobile device that runs on a computer.

- C. It is a tool for debugging code in Android Studio.
- D. It is a software library for building user interfaces in Android apps.

Memo: B - It is a virtual representation of a mobile device that runs on a computer.

(2.9) What annotation is used to preview a composable in Android Studio? [1]

- A. View
- B. Preview
- C. PreviewComposable
- D. ComposablePreview

Memo: B - Preview

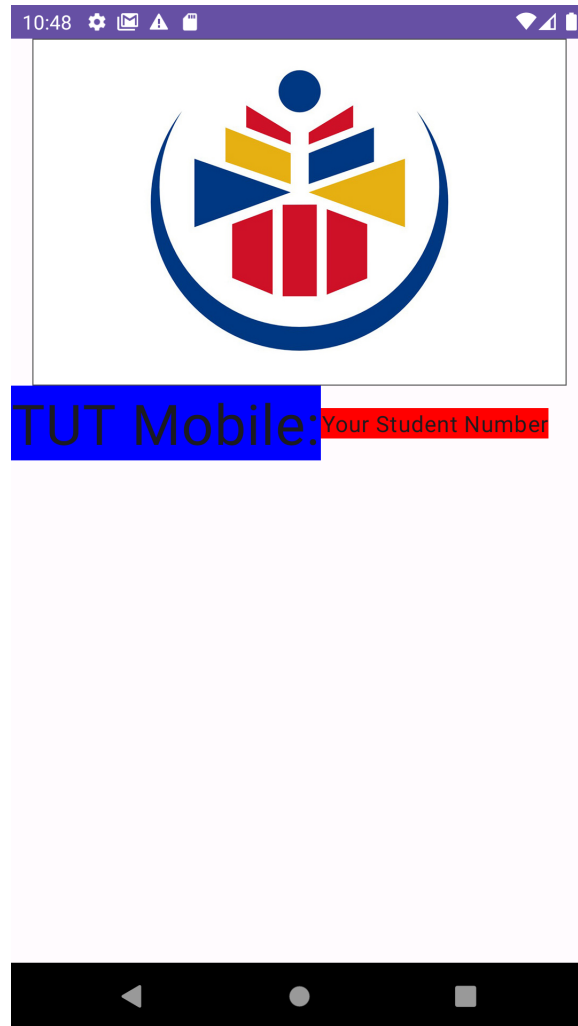
(2.10) Where can you find the option to create a virtual device in Android Studio? [1]

- A. TOOLS > DEVICE SIMULATOR
- B. TOOLS > DEVICE MANAGER
- C. NEW > VIRTUAL DEVICE
- D. NEW > AVD MANAGER

Memo: B - TOOLS > DEVICE MANAGER

Question 3 _____(15)

Design a Jetpack Compose @Composable function named TUT to display the interface below.



The function should adhere to the following requirements:

Layout Structure:

- Utilize composables to achieve a structured layout comprising a Column and a Row.
- Display the TUT logo image at the top of the layout, centered horizontally.
- Below the logo, create a row containing two Text elements, one with the text "TUT Mobile:" displayed in blue and another displaying YOUR own student number eg. 204063982 in red.

Resource Management:

- Ensure the TUT logo is displayed using an appropriate method for loading images in Jetpack Compose.
- Display your student number by accessing the appropriate string resource (R.string.stu_num).

Styling and Visualization:

- Apply a blue background to one Text composable and a red background to the other within the row.
- Set the font size of the "TUT Mobile:" text to 40sp.
- Ensure proper alignment of the text within the row.

Modifiers and Alignment:

- Utilize appropriate modifiers to achieve desired layout dimensions and alignments.
- Ensure the logo is centered horizontally within its container.

Submission Guidelines:

- Submit only the code for your TUT composable function under Question 3

Memo:

```
1 /*  
2  
3 B = Birch  
4 D = Dlamini  
5 L = Langa  
6 H = Hattingh  
7  
8 ## – H START – ##  
9 1 – Composable function TUT created (Params not required)
```

```

10 1 – Attempted to use painterResource for TUT Logo award even if
    painterResource params incorrect
11 3 – painterResource used resource id from R.drawable indicating student
    added logo as resource
12 ## – H END — ##
13
14 ## – B START — ##
15 1 – Attempted to use Box to contain logo image
16 1 – Used modifier in logo Box to fillMaxWidth()
17 1 – Used Alignment.Center in logo Box  contentAlignmen
18 1 – Used Image with correct painter argument even if no contentDescription
    to display image
19 ## – B END — ##
20
21 ## – D START — ##
22 1 – Created row containing 2 text components
23 1 – Row has verticalAlignment set as Alignment.CenterVertically
24 1 – Text for TUT Mobile has a fontSize set to 40.sp
25 ## – D END — ##
26
27 ## – L START — ##
28 2 – Text for student number is correctly loaded as a stringResource from R.
    string
29 1 – Text components wraped in Surface components with correct color set.
30 ## – L END — ##
31 */
32
33 @Composable
34 fun TUT(modifier: Modifier = Modifier) {
35     val TUTLogo = painterResource(id = R.drawable.tut_logo)
36
37     Column {
38         Box(modifier = Modifier.fillMaxWidth(), contentAlignment =
Alignment.Center) {
39             Image(painter = TUTLogo, contentDescription = "The TUT Logo")
40         }
41     Row(

```

```

42         verticalAlignment = Alignment.CenterVertically
43     ) {
44         Surface(color = Color.Blue) {
45             Text(
46                 text = "TUT Mobile:",
47                 fontSize = 40.sp
48             )
49         }
50         Surface(color = Color.Red) {
51             Text(
52                 text = stringResource(R.string.stu_num),
53                 textAlign = TextAlign.Center,
54             )
55         }
56     }
57 }
58 }
59 }

```

Question 4 _____(10)

Provide your answer by selecting Question number 4 and selecting the answer under the corresponding EC sub question number.

(4.1) What is a consideration when converting a when statement to a when expression in Kotlin? [1]

- A. The number of branches must be reduced
- B. Each branch must have a print statement
- C. The else branch must be removed
- D. The last line of each branch must return a value or an expression

Memo: D - The last line of each branch must return a value or an expression

(4.2) What does the if keyword represent in Kotlin? [1]

- A. Start of a condition block
- B. End of a loop
- C. Definition of a function
- D. Variable assignment

Memo: A - Start of a condition block

(4.3) What is the purpose of the is keyword in Kotlin? [1]

- A. Loop iteration
- B. Type check
- C. Variable assignment
- D. Condition evaluation

Memo: B - Type check

(4.4) What is the purpose of using null in Kotlin? [1]

- A. To represent an empty string
- B. To define a variable without initializing it
- C. To indicate the absence of a value

D. To create placeholders for future values

Memo: C - To indicate the absence of a value

(4.5) What does the safe-call operator ?. return if the variable it is applied to is null? [1]

- A. A CompileError error
- B. A StackOverflowError error
- C. An OutOfMemoryError error
- D. null

Memo: D - null

(4.6) What does encapsulation do in object-oriented programming? [1]

- A. Wraps the related properties and methods that perform actions on those properties in a class
- B. Hides the internal implementation logic of a class
- C. Allows you to build a class upon the characteristics and behavior of other classes
- D. Enables the use of different objects in a singleton

Memo: A - Wraps the related properties and methods that perform actions on those properties in a class

(4.7) Which of the following statements best describes a lambda expression in Kotlin? [1]

- A. A lambda expression is a type of function that cannot be stored in a variable
- B. A lambda expression is a concise way to define a function without using the fun keyword
- C. A lambda expression is used only for mathematical operations in Kotlin
- D. A lambda expression can only take one parameter

Memo: B - A lambda expression is a concise way to define a function without using the fun keyword

(4.8) Which of the following statements about returning functions in Kotlin is true? [1]

- A. Functions can be returned from other functions in Kotlin
- B. Functions cannot be returned from other functions in Kotlin
- C. Only lambda expressions can be returned from other functions in Kotlin
- D. Functions can only be returned from higher-order functions in Kotlin

Memo: A - Functions can be returned from other functions in Kotlin

(4.9) What does it mean to invoke a function in Kotlin? [1]

- A. To define a new function
- B. To call a function and execute its body
- C. To store a function in a variable
- D. To pass a function as an argument to another function

Memo: B - To call a function and execute its body

(4.10) What is one disadvantage of using the !! not-null assertion operator in Kotlin? [1]

- A. It results in slower code execution
- B. It reduces code readability
- C. It increases the chance of runtime errors
- D. It may cause a NullPointerException error

Memo: D - It may cause a NullPointerException error

Question 5 _____(10)

Provide your answer by selecting Question number 5 and selecting the answer under the corresponding EC sub question number.

All sub-questions in Question 5 is based on the following code:

```
1 fun DiceWithButtonAndImage(modifier: Modifier = Modifier) {  
2     var result = 1  
3     Column(  
4         modifier = modifier,  
5         horizontalAlignment = Alignment.CenterHorizontally  
6     ) {  
7         Image(painter = painterResource(imageResource), contentDescription  
8             = result.toString())  
9         Button(onClick = { result = (1..6).random() }) {  
10             Text(stringResource(R.string.roll))  
11         }  
12     }  
13 }
```

(5.1) What is the purpose of the DiceWithButtonAndImage function in the provided code? [1]

- A. To display a dice image with a roll button
- B. To display a button with a roll text
- C. To display a dice image with a result text
- D. To display a button with an image

Memo: A - To display a dice image with a roll button

(5.2) Which modifier is used to customize the layout of the DiceWithButtonAndImage function? [1]

- A. Row
- B. Column
- C. Box
- D. ConstraintLayout

Memo: B - Column

(5.3) What does the result variable represent in the DiceWithButtonAndImage function? [1]

- A. The number displayed on the dice
- B. The content description of the dice image
- C. The modifier applied to the layout
- D. The resource ID of the image

Memo: A - The number displayed on the dice

(5.4) How is the alignment of the elements inside the Column defined? [1]

- A. By setting the gravity attribute
- B. By using the alignment parameter
- C. By adjusting the padding
- D. By applying a custom modifier

Memo: B - By using the alignment parameter

(5.5) What action is performed when the button in DiceWithButtonAndImage is clicked? [1]

- A. The image is changed to a new random dice face
- B. The result variable is incremented by one
- C. The result variable is set to a random number between 1 and 6
- D. The image is rotated by 90 degrees

Memo: C - The result variable is set to a random number between 1 and 6

(5.6) Which function is responsible for generating a random number between 1 and 6? [1]

- A. `randomInt(1, 6)`
- B. `random()`
- C. `random(1..6)`

D. `randomInRange(1, 6)`

Memo: C - `random(1..6)`

(5.7) What is the purpose of the `painterResource` function in the provided code? [1]

- A. To draw custom shapes
- B. To load an image resource by its ID
- C. To apply colors to the image
- D. To define the size of the image

Memo: B - To load an image resource by its ID

(5.8) Which Compose component is used to display an image in the `Dice-WithButtonAndImage` function? [1]

- A. `ImageView`
- B. `ImageBox`
- C. `Image`
- D. `ImageResource`

Memo: C - `Image`

(5.9) What does the content description of the image represent? [1]

- A. The actual content of the image
- B. The result of the dice roll
- C. A description for accessibility purposes
- D. The resource ID of the image

Memo: C - A description for accessibility purposes

(5.10) Which resource is used for the text displayed on the button in `Dice-WithButtonAndImage`? [1]

- A. `stringResource(R.string.button_text)`
- B. `stringResource (R.string.roll)`
- C. `stringResource (R.string.dice)`
- D. `stringResource (R.string.image)`

Memo: stringResource (R.string.roll)

Question 6 _____(15)

You are tasked with designing a Jetpack Compose `@Composable` function named `LabEq` to manage lab resources. The function should satisfy the following requirements:

Input Fields:

- Include two `OutlinedTextField` composables to input the number of computers and students, respectively.
- The first `OutlinedTextField` should prompt for the number of computers available in the lab.
- The second `OutlinedTextField` should prompt for the number of students intending to use the lab.

Button Functionality:

- Implement a `Button` composable labeled "Check Student Numbers" to validate the availability of resources.
- Upon clicking the button, calculate the availability of computers compared to the number of students.
- If the number of computers exceeds the number of students, display a message indicating that the lab can be used for the test.
- If the number of students exceeds the number of computers, compute the additional computers required and display a message accordingly.

Message Display:

- Utilize a `Text` composable to dynamically display the message based on the comparison results.
- Ensure the message is styled using the `bodyMedium` typography defined in the `MaterialTheme`.

Modifiers and Layout:

- Apply appropriate modifiers to achieve padding and spacing within the column layout.
- Arrange the composables vertically with a specified spacing between them.

Input Validation:

- Validate user input to ensure that only numeric values are accepted for both the number of computers and students.
- Handle cases where invalid or empty input is provided by defaulting to a value of 0.

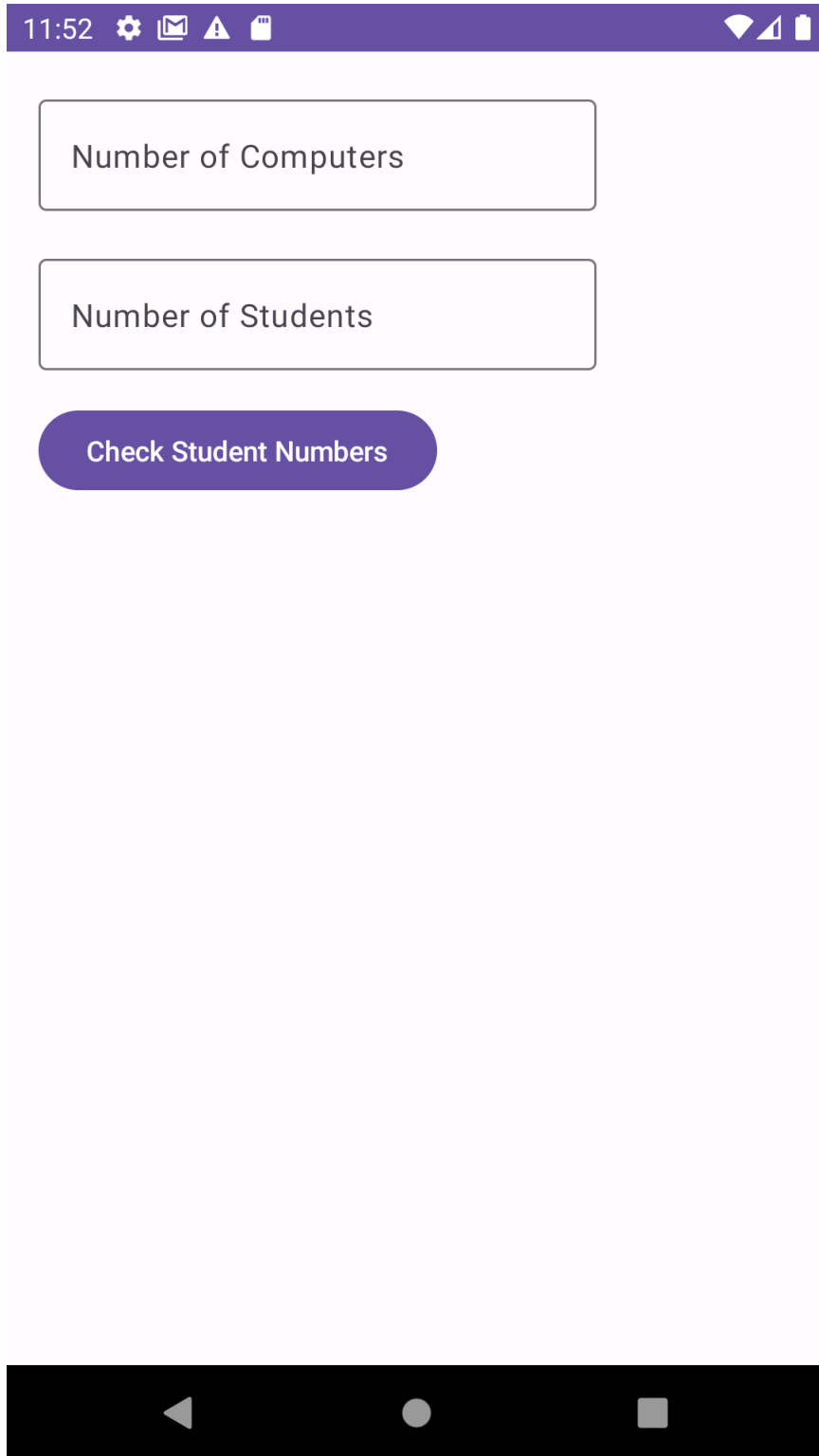
Lab Name Argument:

- Accept the name of the lab as a parameter (`labName`) in the `LabEq` function.

Submission Guidelines:

- Submit only the code for your `LabEq` composable function under Question 6

Screenshots:



Number of Computers

Number of Students





Check Student Numbers




Lab 10-140 can be used for the test

1	2	3	-
4	5	6	_
7	8	9	⌫
,	0	.	↩



11:55





Number of Computers

30

Number of Students

60

Check Student Numbers

Lab 10-140 will need 30 more computers.

1

2

3

-

4

5

6

_

7

8

9


⌫

,

0

.

↩



Memo:

1

2

```

3  /*
4
5  B = Birch
6  D = Dlamini
7  L = Langa
8  H = Hattingh
9
10 ## – B START – ##
11 1 or 0 – Function named LabEQ (no other names) recieveing string param.
    Function marked as composable.
12 1 or 0 – Mutable variables created. Variables should cover all question
    requirements.
13 2 – UI components orginized with main Column. Column contains all other
    components.
14 1 – Some padding applied to Column (does not have to be exact)
15 ## – B END – ##
16
17 ## – D START – ##
18 1 – Either of the OutlinedTextFields are created with the mutable variables
    as value
19 1 – Either of the OutlinedTextFields has on change set correctly
20 1 – Either of the OutlinedTextFields has the label set correctly
21 1 – Either of the OutlinedTextFields has keyboardoptions set to number only
22 ## – D END – ##
23
24 ## – L START – ##
25 1 – Button created with correct Text
26 2 or 0 – Button onClick logic will check / convert the string mutable(s) to
    int. Including checking for null and setting to 0
27 2 or 0 – If logic to check if lab can be used for test correctly
    implemented including calc to check how many additional computers is
    needed
28 1 – Message constructed using labName param and calcInfo if needed in
    correct code section according to logic.
29 ## – L END – ##
30
31 */

```

```

32 @Composable
33 fun LabEq(labName: String) {
34
35     var computers by remember { mutableStateOf("") }
36     var students by remember { mutableStateOf("") }
37     var message by remember { mutableStateOf("") }
38
39
40     Column(
41         modifier = Modifier.padding(16.dp),
42         verticalArrangement = Arrangement.spacedBy(16.dp)
43     ) {
44         OutlinedTextField(
45             value = computers,
46             onChange = { computers = it },
47             label = { Text("Number of Computers") },
48             keyboardOptions = KeyboardOptions(keyboardType = KeyboardType.
Number)
49         )
50         OutlinedTextField(
51             value = students,
52             onChange = { students = it },
53             label = { Text("Number of Students") },
54             keyboardOptions = KeyboardOptions(keyboardType = KeyboardType.
Number)
55         )
56
57         Button(onClick = {
58             val compValue = computers.toIntOrNull() ?: 0
59             val studentsValue = students.toIntOrNull() ?: 0
60
61             if(compValue > studentsValue)
62             {
63                 message = "Lab $labName can be used for the test"
64             }
65             else{
66                 val compNeeded = studentsValue - compValue

```

```
67         message = "Lab $labName will need $compNeeded more
computers."
68     }
69
70     }) {
71         Text("Check Student Numbers")
72     }
73     Text(
74         text = message,
75         style = MaterialTheme.typography.bodyMedium
76     )
77 }
78 }
```

PAPER TOTAL 70

– END –

This assessment had 6 questions, for a total of 70 points.
