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First Name _____

Student Number

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Venue _____

Seat Number _____



No exam materials may be removed from the exam room.

Computer Science and Software Engineering
EXAMINATION

Mid-year Examinations, 2021

SENG365-21S1 (C) Web Computing Architectures

For Examiner Use Only

Examination Duration: 120 minutes

Exam Conditions:

Closed Book exam: Students may not bring in any written or printed materials.

No calculators are permitted

Materials Permitted in the Exam Venue:

None.

Materials to be Supplied to Students:

1 x Write-on question paper/answer book

Instructions to Students:

Question	Mark
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[illegible]

Questions Start on Page 3

Section A: Client-side scripting

Scenario: You have been tasked with creating a new travel website called tripavoider.com. To demo some ideas, you decide to sketch a basic webpage with HTML, CSS, and Javascript. The following script is what you've written so far.

```
Line #
1  <!DOCTYPE html>
2  <html>
3      <head>
4          <title>Review a trip to avoid.</title>
5      </head>
6      <body>
7          <style>
8              TODO
9          </style>
10         <h3 id="score" Enter your review score.</h3>
11         <p>
12             Review score: <input id="scoreval" type="number min=1 max=100 value=50
name="score">
13         </p>
14         <button TODO name='button'>Submit score</button>
15
16         <script>
17             // 'use strict';
18             function writeScore(score) {
19                 console.log(score);
20             }
21             function makeReview()
22                 'use strict';
23                 let value = document.getElementById(TODO).value;
24                 TODO
25             }
26         </script>
27     </body>
28 </html>
```

1. Identify 2 typos in the code (ignoring **TODOs**). [2 marks]

ANSWER:

2. At line 8, write a brief CSS style rule to set all button elements to have centred, white-coloured text with a blue background colour. [3 marks]

ANSWER:

3. Modify line 14 so that the `makeReview` function is executed when the user clicks the button. [3 marks]

ANSWER:

4. At line 23, write in the correct parameter. [1 mark]

ANSWER:

5. At line 24, write code to update the text inside the `h3` tag to read, "You have given this trip the score: ", and include the score value. [2 marks]

ANSWER:

Section B: Communication between Client and Server

6. What is a forbidden header name, give an example, and explain why they exist. [3 marks]

ANSWER:

7. Explain why an XMLHttpRequest does not block execution of a web app. Include in your answer the roles of the Javascript engine and the runtime environment in the browser that make that happen. [5 marks]

ANSWER:

8. Describe the full web socket handshake mechanism. [7 marks]

ANSWER:

Section C: Performance

9. List three different functions that a bundler performs to improve the performance of a webpage or its development. [3 marks]

ANSWER:

10. You are using ETAG caching to speed up the loading of your website.

- a. When a client first makes a GET request for `style.css` from your server, how is the caching information sent to the client? [3 marks]

- b. The next time the client needs to request `style.css`, how does it know to use a cached version of the file? [3 marks]

11. For a Javascript framework that implements data binding using a virtual DOM, describe the steps that are involved to update the HTML elements when the model changes. [4 marks]

ANSWER:

12. You have decided to implement your own Javascript minimizer to reduce the size of the files that are downloaded for your new website. Your minimizer converts the code on the top to the code on the bottom (see below). However, there is a problem with the conversion. What is it and why is it a problem? [3 marks]

```
function decrementer(val) {  
  function do_decrement() {  
    val = val - 1;  
    console.log(val);  
  }  
  do_decrement();  
}
```

```
function a(b){+function(){b-=1,console.log(b)}{}}
```

ANSWER:

13. If your web code needs to be transpiled is that done on the server or by the browser?
[1 mark]

ANSWER:

14. You are working on a budget and you want to make your single page application run in a desktop browser and as an app on mobile devices and tablets. It should also work when internet connection is down. What web APIs would you use and why? [4 marks]

ANSWER:

Section D: Vue.js

Scenario: Your development team are considering redesigning the current client for the Tripavoider site to use Vue.js version 3, so that you can implement a Single Page Application (SPA) on a browser client. You have sketched out the partially completed code below:

```

Line #
10 <body>
11   <div id="toolbar" />
12   <div id="locs">
13     <ol>
14       <li v-for="(place, index) in places">
15         <h1>{{place.title}}</h1>
16         <p>{{place.description}}</p>
17         <ol>
18           <li v-for="rev in place.reviewers">
19             {{rev.name}}, {{rev.score}}
20           </li>
21         </ol>
22         <p>Average review score: TODO </p>
23       </li>
24     </ol>
25   </div>
26 </body>

101 let place_information = {
102   places: [
103     { id: 3355,
104       title: 'University of Canterbury',
105       description: 'It is a university in Christchurch, NZ',
106       visible: true,
107       reviewers: [
108         {name: 'Bill Bryson', score: 3},
109         {name: 'Paul Theroux', score: 5},
110         {name: 'Marco Polo', score: 1}
111       ]
112     },
113     ...
114   ]
115 };

250 const { createApp } = Vue;
251 const app = createApp({
252   data() {
253     TODO
254   },
255   methods: {
256     averageScore(place_index) {
257       TODO
258     }
259   }
260 });
261 computed: { //none provided here}
262 });
263 app.mount(TODO);

```

15. Complete the code that should go in the data property, line 254. [4 marks]

ANSWER:

16. Implement the averageScore method by completing the code at lines 22 and 258. [4 marks]

ANSWER:

17. Fill in the parameter that should be passed to the `app.mount` function at line 263. [2 marks]

ANSWER:

18. Explain using reference to lines of code, or code constructs, above how the design pattern is implemented in VueJS. [2 marks]

ANSWER:

19. Can the averageScore method (line 257) be implemented as a computed property? Why or why not? [2 marks]

ANSWER:

20. If you wanted to update the code to download the place information initially from an API, what changes would you need to make in the code? (You do not need to write code, but describe all the modifications that are necessary). [3 marks]

ANSWER:

21. Rewrite line 14 so that it only places with the visible property equal to true are shown. [2 marks]

ANSWER:

22. What differentiates a router in a single-page application from traditional website routing? [3 marks]

ANSWER:

Section E: Server testing

Scenario: You have been asked to review the following automated test. The test case and the software under test were both derived from an API specification. You can assume that all variables, such as `server_url`, have been properly defined.

Line #

```
1 describe('POST/login with parameters in query string', () => {
2   it('Should return 200 status code, id, auth token and details', () => {
3     return chai.request(server_url)
4       .post('/users/login')
5       .body(
6         {
7           email: "me@tripavoider.com",
8           password: "passw0rd"
9         }
10      )
11     .then((res) => {
12       expect(res).to.have.status(200);
13       expect(res).to.be.json;
14       expect(res.body).to.have.property('guid');
15       expect(res.body).to.have.property('tok');
16       expect(res.body).to.have.property('details');
17       authorisation_token = res.body['tok'];
18       user_id = res.body['user_id'];
19     })
20     .catch((err) => {
21       throw err;
22     });
23   });
24 });
```

23. Assuming that the test runs successfully, write out the data you would expect to be returned in the body of a successful HTTP response. As you don't know what actual values would be returned in the response, you can use made-up values or indicate where a value would be included in the data structure. [3 marks]

ANSWER:

24. Fix the message sent to the `describe` function to more accurately explain the request that is being tested. [2 marks]

ANSWER:

25. Assuming the test executes, what are three different ways in which the test might report a failed test? Support your answer with explicit reference to lines of code, or to code constructs. [3 marks]

ANSWER:

End of Examination