Family Name   _____

First Name   _____

Student Number |__|__|__|__|__|__|__|__|

Venue   _____

Seat Number   _____

No electronic/communication devices are permitted.

No exam materials may be removed from the exam room.

Computer Science and Software Engineering

EXAMINATION

Mid-year Examinations, 2019

SENG365-19S1 (C) Web Computing Architectures

For Examiner Use Only

Question	Mark

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:

Attempt all questions

Total _____

Questions Start on Page 3

Scenario

After successfully completing your first year at ExperienceThis! (New Zealand's fourth-most-popular travel experience and music venue website), you are stoked to learn that your hard work has paid off in the form of a promotion to Front End Web Developer.

Section A: Single Page Applications [6 marks]

1. AJAX is an acronym. Ignoring the second A ("and"), one of the remaining letters stands for something which is no longer especially true or accurate today. What is the letter, and what does it stand for? [1 mark]

2. Name the three standard technologies for, respectively, presentation, styling and computation in a SPA? [1 mark]

3. In one or two sentences, identify the key differences or innovations, compared to static websites, that enabled SPAs. Address concepts not specific technologies: [2 marks]

4. Name **two** important reasons why ExperienceThis! might have implemented their front-end as a SPA rather than as a static website: [2 marks]

Section B: Client-side Scripting   **[16 marks]**

5. Is the event loop for javascript in the browser single or multi-threaded?   [1 mark]

6. Give the output of the following javascript fragment: [1 mark]

```
console.log("1");
setTimeout(()=>console.log("2"), 0);
console.log("3");
```

Figure 1. Client-side scripting code example

```
1    <!DOCTYPE _____>
2    <html>
3        <head>
4            <title>Rate your travel experience!</title>
5        </head>
6        <body>
7            <style>
8
9            </style>
10           <h1 id='result'>How was your experience?</h1>
11       </body>
12       <p>
13           <input id='score' type='number' min=1 max=5 value=3
     name='score'>
14       </p>
15       <button onclick='_____' name='button'>Go</button>
16       <script>
17       'use strict';
18       const addScore = () => {
19
20
21       }
22       </script>
23   </html>
```

Review the code in Figure 1.

7. Complete the DOCTYPE statement in line 1:   [1 mark]

8. Provide a CSS rule in line 8 to set the color of the input field to yellow: [2 marks]

9. If the user did not enter a value into the form, and simply pressed the 'Go' button, state the value that would be passed by default: [1 mark]

10. What is the purpose **and** benefit of the `'use strict';` statement in line 17?   [2 marks]

11. Identify the part or parts of the code fragment that indicate that this is ES6 code: [2 marks]

12. Complete the `onclick` attribute in the button element in line 15:   [2 marks]

13. Complete the `onScore()` function so that it displays the value from the `input` field (line 13) as the `innerHTML` of the `h1` element (in line 10):   [4 marks]

Section C: Client-side Security   **[14 marks]**

14. The ExperienceThis! app is on this URL: `https://experiencethis.co.nz:4941`

   Place a tick or mark beside each URL which is considered to be the **same origin under the SOP as the URL** for the ExperienceThis! app: [2 marks]

URL	Same under SOP?
`http://experiencethis.co.nz:4941`	
`https://experiencethis.com,:4941`	
`https://experiencethis.co.nz:80`	
`https://experiencethis.co.nz/awesomevenus:4941`	

15. What are legitimate reasons for an application to make a cross-site request?   [2 marks]

16. Is the primary purpose of CORS to safeguard the user of an application or the backend server? [1 mark]

17. Which of browser, server, or client app is responsible for enforcing the restrictions imposed by the CORS headers? [1 mark]

18. Assume that a particular server request is blocked by CORS. What data is received by the web app (running in a browser)? [1 mark]

19. `Access-Control-Origin` is an example of a forbidden header. What is a forbidden header in CORS? [1 mark]

20. Give a brief reason why CSRF is no longer included in the latest (2017) OWASP Top Ten: [2 marks]

21. Provide a one line description of the XSS vulnerability: [2 marks]

22. Which of the following Javascript DOM manipulation methods are considered "safe" when assessing vulnerability to client-side XSS attacks?

    Place a mark beside each method in the appropriate column.   [2 marks]

Method	Safe	Not safe
elem.innerHTML()		
JSON.parse()		
eval()		
elem.innerText()		

Section D: Testing and Deployment   [11 marks]

23. Provide **three** brief advantages of automated testing over manual testing: [3 marks]

24. Provide **two** important reasons for including manual tests in a test strategy: [2 marks]

25. In one or two sentences, what is the purpose **and** value of "bundling" in production web apps?   [2 marks]

26. What is the purpose of UglifyJS when used with production web apps?   [1 mark]

27. What are **two** important reasons for the use of modules in web applications?   [2 marks]

28. What module format is implied by the use of require() in node.js: [1 mark]
    CommonJS, AMD, or require.js?

Section E: Vue.js   [13 marks]

Your development team is contemplating rewriting your existing SPA using a newer frontend framework, Vue.js. To help your colleagues understand the concepts behind Vue you whiteboard the code fragment in Figure 2.

29. Complete the missing regions of the code (marked by the underscores) at lines 4, 5, 17, 19 and 26 in Figure 2:   [5 marks]

Line	Missing code
4	
5	
17	
19	
26	

30. Match the components of the MVVM design pattern to elements in the script fragment. Identify the line from Figure 2 that **best** illustrates the connection for each: [3 marks]

Component	Line number in Figure 2
Model	
View	
ViewModel	

Figure 2: Vue.js code example

```
1     <div id="experiences-list">
2       <ol>
3         <list-item
4           v-___="item in experiences"
5           v-bind:____="item"
6           v-bind:key="item.id"
7         ></list-item>
8       </ol>
9       <p>{{ experienceCount }} wonderful experiences!</p>
10    </div>
11    Vue.component('list-item', {
12      props: ['item'],
13      template: '<li>{{ item.text }}</li>'
14    })
15
16    var app = new Vue({
17      el: '_____',
18      data: {
19        _____: [
20          { id: 0, text: 'Guided hike to Half Dome' },
21          { id: 1, text: 'Paragliding from El Capitan' },
22          { id: 2, text: 'Free climbing the Nose' }
23        ]
24      },
25      computed: {
26        _____: function() {
27          return this.experiences.length
28        }
29      }
30    })
```

31. What is the form of template syntax (e.g., "{{ }}") used by Vue: [1 mark]

   Handlebars, Mustache, or Brackets?

32. What is a Vue directive **and** how are Vue directives implemented in HTML?

[2 marks]

33. What are **two** differences between a Vue `computed` and a Vue `method` property?

[2 marks]

End of Examination