Exercise 1: HTTP

a. Is a HTTP-based communication between a client and a server synchronous or asynchronous? Explain (3 points)

HTTP-based communication between a client and a server is synchronous because the client can not send new request to the server while waiting for the answer on a previous request.

How it works:

- A client send a request to a server.
- The server generates completely new web page and sends it to the client.

b. Is the HypertextTransferProtocol stateless or stateful? Explain (3 points)

HTTP protocol is stateless because does not require the server to retain information or status about each user for the duration of multiple requests. HTTP treats each request as an independent transaction that is unrelated to any previous request so that the communication consists of independent pairs of request and response[1].

Exercise 2: JavaScript

a. **How can external JavaScript files be included into HTML? Explain (2 points)**

One of the reasons to add an external JavaScript file into HTML file is for speeding up page loads.

To use JavaScript from an external file source, you need to write all your JavaScript source code in a simple text file with the extension ".js" and then include that file as shown above.

...

```
<head>
  <script type="text/javascript" src="external_javascript.js"></script >
</head> ...
```

b. **Where in a HTML page can JavaScript code be embedded? Explain (2 points)**

It is possible to include JavaScript code almost anywhere in an HTML document. The most preferable ways to include JavaScript in an HTML are follow three:

[1] https://en.wikipedia.org/wiki/Stateless_protocol

- **Script in <head>...</head> section** (if script has to run on some event):

```
<html>

   <head>

      <script type="text/javascript">
         <!--
            function sayHello() {
               alert("Hello World")
            }
         //-->
      </script>

   </head>

   <body>
      <input type="button" onclick="sayHello()" value="Say Hello" />
   </body>

</html>
```

- **Script in <body>...</body> section** (if script has to run as the page loads so that the script generates content in the page)

```
<html>

   <head>
   </head>

   <body>

      <script type="text/javascript">
         <!--
            document.write("Hello World")
         //-->
      </script>

      <p>This is web page body </p>

   </body>
</html>
```

- **Script in <body>...</body> and <head>...</head> sections**

```
<html>
   <head>
      <script type="text/javascript">
         <!--
            function sayHello() {
               alert("Hello World")
            }
         //-->
      </script>
   </head>

   <body>
      <script type="text/javascript">
         <!--
            document.write("Hello World")
         //-->
      </script>

      <input type="button" onclick="sayHello()" value="Say Hello" />

   </body>
</html>
```

Exercise 4: Ajax

- User sends a request from the UI and a javascript call goes to XMLHttpRequest object.
- HTTP Request is sent to the server by XMLHttpRequest object.
- Server interacts with the database using JSP, PHP, Servlet, ASP.net etc.
- Data is retrieved.
- Server sends XML data or JSON data to the XMLHttpRequest callback function.
- HTML and CSS data is displayed on the browser.

For users AJAX is a great technology, because it improves user-experience in general, by decreasing the number of times the page needs to be reloaded. AJAX won't replace classic web application model completely, but it can improve it.

Provide an example of a web application which uses Ajax. (1 point)

e.g. **Twitter** has started using AJAX with their ‘trending topics’ pages. Every few seconds, the page lets the user know that more tweets have been made about the subject, giving them up-to-the-second updates.