The idea for this homework is to have you practice playing with the SOP policy. You can write your own HTML files and view them in your browser without needing to run a web server. First review the SOP policy for cookies and the SOP policy for JavaScript. Recall that for cookies, it further depends on the path to the resource. You can create your own directories and put HTML files in them to try this out.

Here is an HTML page that properly sets a cookie:

```
<html>
<head>
<script>
function setCookie(cname, cvalue, exdays) {
  var d = new Date();
  d.setTime(d.getTime() + (exdays * 24 * 60 * 60 * 1000));
  var expires = "expires=" + d.toUTCString();
  document.cookie = cname + "=" + cvalue + ";" + expires
                    + ";path=" + document.location.pathname;
}

function makeCookie() {
  setCookie("secret","Z29vZCB3b3JrIQo=", 5);
  document.getElementById("d").textContent = document.cookie;
}

</script>

</head>
<body onload="makeCookie()">

Your cookie is <div id="d"></div>
</body></html>
```

Create a directory structure of such files where you set different values to see how the SOP policy for cookies operates. Remember to change one of the first two arguments in the setCookie function so that it is clearer when it is working.

Now, suppose that a company serves websites for users' from

`https://www.online-private-diary.com/[username]/`

Anyone can sign up with a chosen username and write their private thoughts online. They can also choose to make it public, and if they chose to do so, then anyone can visit the website and see those thoughts as well. The company allows users to put in HTML and JavaScript into their webpages.

Suppose that alice has a private journal and bob has a public journal. They are served respectively at:

`https://www.online-private-diary.com/alice/`

and

`https://www.online-private-diary.com/bob/`

The site uses cookie authentication for the private accounts, so alice can only see her private entries if she has previously authenticated and sends the authentication cookie.

Because of how the SOP works, it is possible for Bob to learn all of Alice's private journal entries? What has to happen for the attack to work? Develop a proof-of-concept Bob page to copy out data from Alice's diary. You do not need to worry about a working cookie-based authentication, but use the example webpage that displays cookies so you can be sure that it would defeat cookie-based authentication in practice.