Practice Problem Set 1
1 Hour

Q1	Midterm 201712 P2	URL	___ / 8 points
Q2	Midterm 201706 P3	URL	___ / 10 points
Q3	Midterm 201606 P2	prototype	___ / 11 points
Q4	Final 201712 P1	GraphQL vs. REST API	___ / 8 points
Q5	Final 201803 P17	GraphQL vs. REST API	___ / 8 points
Q6	Final 201712 P7	DDOS attack	___ / 8 points
Q7	Final 201703 P15	DNS	___ / 9 points
Q8	Certificate Authority		___ / 4 points
	Total		___ / 66 points

Q1

Problem #2 (8 points)

2A (5 points)
Consider the following URL:

`http://web.stanford.edu:80/class/cs142/lectures/URLs.html?professor=Rosenblum`

Given the following components of a URL we learned in lecture, please identify them in the URL provided by underlining (note: since the underlines may come close to each other, you may want to alternate between squiggly underlines and straight underlines for visual clarity) each component and writing the corresponding letter underneath. If you believe the component doesn't exist in this URL, you may ignore it.

Server's port number (A)
Scheme (B)
Hierarchical portion (C)
Fragment (D)
Hostname (E)
Query parameters (F)

For example, if you believed ":80/class/cs142" was the server's port number, part of your answer would look like:

`http://web.stanford.edu:80/class/cs142/lectures/URLs.html?professor=Rosenblum`
`A`

2B (3 points)
Assume that the page fetched by the URL in Problem 2A is properly formatted HTML that contains several hyperlinks. For each of the hyperlinks underline the part of the URL that will change when the link is clicked:

`<a href="index.html">index.html</a>`

`http://web.stanford.edu:80/class/cs142/lectures/URLs.html?professor=Rosenblum`

`<a href="/index.html">/index.html</a>`

`http://web.stanford.edu:80/class/cs142/lectures/URLs.html?professor=Rosenblum`

`<a href="#foo">#foo</a>`

`http://web.stanford.edu:80/class/cs142/lectures/URLs.html?professor=Rosenblum`

Q2

Problem #3 (10 points)

(a) You would like to load the page **`junipers.html`** from **`www.trees.org`**, using HTTP. Additionally, you want to pass the parameter **`species`** to the server with a value of **`californica`**. Please construct the URL you would use to access this page, and **label all components of the URL**.

(b) Having navigated to the page above, you see it contains several links. For each of the links below, circle the correct option:

```
<a href="/junipers.html#~cultivation">Link 1</a>
```

The type of this link is:	Absolute	Relative	Other
This link contains invalid characters:	True	False	
This link causes a page reload:	True	False	

```
<a href="/spruces.html#classification&naming">Link 2</a>
```

The type of this link is:	Absolute	Relative	Other
This link contains invalid characters:	True	False	
This link causes a page reload:	True	False	

```
<a href="#juniper_berry">Link 3</a>
```

The type of this link is:	Absolute	Relative	Other
This link contains invalid characters:	True	False	
This link causes a page reload:	True	False	

Q3

Problem #2 (11 points)

(A)

The following JavaScript program creates two objects named "obj" and "proto" and sets the prototype of obj to be proto. For each of the console.log statements in the program, write the three numbers (or the word undefined if the value printed would be undefined) in the provided slots on the side.

```
var proto = {a: 1, b: 2, c: 3};
var obj =  {a: 0};

obj.__proto__ = proto;    // This sets the object's prototype to be the proto


console.log(obj.a, obj.b, obj.c);  // log1        _______,  _______, _
_
proto.a = 5;
proto.b = 6;
proto.c = 7;
console.log(obj.a, obj.b, obj.c);   // log2       _______,  _______, _
_

obj.a = 9;
obj.b = 8;
console.log(proto.a, proto.b, proto.c);  // log3  _______,  _______, _
_



console.log(obj.a, obj.b, obj.c);    // log4      _______,  _______, _
_
```

(B)

What is the difference between adding a method to a class via the prototype pattern versus. assigning the method to the constructed object in the object's constructor?

Q4

Problem #1 (8 points)

Mobile devices offer some challenges for web applications beyond the typical desktop computer. Among the challenges are:

A. Smaller screen sizes which can display less information in a view.
B. Much higher latency and lower bandwidth Internet connections.

Describe the advantages that GraphQL has over REST APIs for dealing with these mobile challenges.

Q5

Problem #17 (8 points)

REST and GraphQL are two different protocols used to fetch model data for web applications. Assume you have a web application with users located in countries where connections to the web app's backend servers use **low bandwidth networks** with **long round trip times**. Is either REST or GraphQL advantageous over the other under these communication characteristics? Justify your answer.

Q6

Problem #7 (8 points)

Imagine you put your Project 8 Photo App into production. Your site's fresh style and innovative user experience starts drawing all the millennials away from current photo sharing applications. They become upset that your site is taking business away from them and causing them to lose on advertising revenue, so they rent a botnet to conduct a DDOS attack on your site.

Provide **two** ways that the botnet could be configured to send requests to attack your site. Be specific about what API is targeted and why that would be an effective DDOS attack. For each way you list describe something you could do to mitigate or guard against the attack.

Q7

Problem #15 (9 points)

Describe an attack that can be launched if a hacker could become the Domain Name Service (DNS) server for a user's browser.

Question 8
How does certificate authority work? Fill in the blank with choices of words: certificate, public key, private key

1. Service provider (e.g. Amazon.com) gives ___ to certificate authority.
2. certificate authority gives ___ to service provider.
3. Service provider passes ___ to browsers.
4. Browsers send ___ to service provider.