







You may be editing this assignment in multiple tabs or browser windows. To prevent data loss, we recommend editing in only one window at a time.

## Edit Assignment




**⚠** This assignment has been released to students. Updating questions will not affect students' existing submissions. You can use the *Regrade All Submissions* button on the **Manage Submissions** page to regrade all existing submissions.

QUESTION 1	POINTS	 Delete Question
Title	2	
<b>PROBLEM</b> <span style="float: right;"> Insert Images  Insert Field</span>		
<div style="border: 1px solid #ccc; padding: 10px;"> <p>List two explicit non-goals when the Internet was first designed.</p> <p> ____ </p> </div>		
<a href="#">↪ Add Subquestion</a>		

+

QUESTION 2	POINTS	 Delete Question
Title	3	
<b>PROBLEM</b> <span style="float: right;"> Insert Images  Insert Field</span>		
<div style="border: 1px solid #ccc; padding: 10px;"> <p>Explain how the retransmission timeout is calculated in the congestion avoidance and control paper.</p> <p> ____ </p> </div>		
<a href="#">↪ Add Subquestion</a>		

+

QUESTION 3	POINTS	 Delete Question
Title	2	
<b>PROBLEM</b> <span style="float: right;"> Insert Images  Insert Field</span>		

Weighted Fair Queueing (or really any fair queueing algorithm) is evaluated against an idealized fair queueing algorithm. Describe this idealized fair queueing algorithm.

|\_\_\_\_|

↳ Add Subquestion



**QUESTION 4**

**POINTS**

✕ Delete Question

Title

2

**PROBLEM**

Insert Images Insert Field

Describe the concept of isolation in the context of fair queueing algorithms.

|\_\_\_\_|

↳ Add Subquestion



**QUESTION 5**

**POINTS**

✕ Delete Question

Title

2

**PROBLEM**

Insert Images Insert Field

Where does XCP get a flow's round-trip time and congestion window from, given that it doesn't maintain per-flow state?

|\_\_\_\_|

↳ Add Subquestion



**QUESTION 6**

**POINTS**

✕ Delete Question

Title

2

**PROBLEM**

Insert Images Insert Field

If you visualize the Internet as a graph of autonomous systems, how has this graph evolved over the last few decades? Why?

|\_\_\_\_|

↳ Add Subquestion



**QUESTION 7**

**POINTS**

✕ Delete Question

Title

3

**PROBLEM**

Insert Images Insert Field

What is the network transfer function and what is the topology transfer function in the context of the header space analysis paper?

|\_\_\_\_|

↳ Add Subquestion



**QUESTION 8**

**POINTS**

✕ Delete Question

Title

2

**PROBLEM**

Insert Images Insert Field

Describe the Heartbleed vulnerability.

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↳ Add Subquestion



**QUESTION 9**

**POINTS**

✕ Delete Question

Title

2

**PROBLEM**

Insert Images Insert Field

Why did the Heartbleed paper authors have to come up with an estimate for their false negatives instead of just re-running their experiments?

|\_\_\_\_|

↳ Add Subquestion



<b>QUESTION 10</b>	<b>POINTS</b>	<b>✕ Delete Question</b>
Title	2	
<b>PROBLEM</b>		<b>Insert Images</b> <b>Insert Field</b>
<p>What is the drawback of vanilla Tor from a censorship circumvention perspective?</p> <p> ____ </p>		
↳ Add Subquestion		






<b>QUESTION 11</b>	<b>POINTS</b>	<b>✕ Delete Question</b>
Title	2	
<b>PROBLEM</b>		<b>Insert Images</b> <b>Insert Field</b>
<p>What is the purpose of the matching algorithm in the LTEye paper?</p> <p> ____ </p>		
↳ Add Subquestion		






<b>QUESTION 12</b>	<b>POINTS</b>	<b>✕ Delete Question</b>
Title	2	
<b>PROBLEM</b>		<b>Insert Images</b> <b>Insert Field</b>
<p>How is the unique user ID (i.e., the C-RNTI) extracted in the LTEye paper?</p> <p> ____ </p>		
↳ Add Subquestion		






<b>QUESTION 13</b>	<b>POINTS</b>	
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Title	3	 Delete Question
<b>PROBLEM</b>		
 Insert Images  Insert Field		
<p>Would Sprout work equally well in the context of the wired Internet? Why or why not?</p> <p> ____ </p>		
<a href="#">↪ Add Subquestion</a>		



<b>QUESTION 14</b>	<b>POINTS</b>	 Delete Question
Title	4	
<b>PROBLEM</b>		
 Insert Images  Insert Field		
<p>Let's say you have an AP with 2 antennas (1 and 2) sending packets <math>x_1</math> destined for user 1 and <math>x_2</math> destined for user 2---as in a classical multi-user MIMO setup. Denote the channel from AP's antenna 1 to user 2 as <math>h_{12}</math>, antenna 2 to user 1 as <math>h_{21}</math>, etc.</p> <p>Let's say the channels have the following values: <math>h_{11}=2</math>, <math>h_{12}=4</math>, <math>h_{21}=2</math>, <math>h_{22}=4</math>. What should <math>x_1</math> and <math>x_2</math> be multiplied by in order that user 1 and user 2 can successfully decode what they receive (i.e., <math>y_1</math> and <math>y_2</math>) without any interference?</p> <p> ____ </p>		
<a href="#">↪ Add Subquestion</a>		



<b>QUESTION 15</b>	<b>POINTS</b>	 Delete Question
Title	3	
<b>PROBLEM</b>		
 Insert Images  Insert Field		
<p>Explain the concept of onion routing as used in the Tor system.</p> <p> ____ </p>		
<a href="#">↪ Add Subquestion</a>		



<b>QUESTION 16</b>	<b>POINTS</b>	 Delete Question
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Title 2

PROBLEM

Insert Images Insert Field

Explain the attack carried out by the authors of the Tor traffic analysis paper.

|\_\_\_\_|

↳ Add Subquestion



QUESTION 17

POINTS

Delete Question

Title 2

PROBLEM

Insert Images Insert Field

In the full-duplex radio paper, what is self-interference cancelation?

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↳ Add Subquestion



QUESTION 18

POINTS

Delete Question

Title 3

PROBLEM

Insert Images Insert Field

What are the 3 kinds of self-interference cancelation that the full-duplex radio paper attempts to deal with?

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↳ Add Subquestion



QUESTION 19

POINTS

Delete Question

Title 3

PROBLEM

Insert Images Insert Field

Explain how private keys could be stolen using the Heartbleed vulnerability.

|\_\_\_\_|

↳ Add Subquestion



**QUESTION 20**

**POINTS**

✕ Delete Question

Title

2

**PROBLEM**

Insert Images Insert Field

What is perfect forward secrecy and how does it help in the event that a private key is stolen?

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↳ Add Subquestion



**QUESTION 21**

**POINTS**

✕ Delete Question

Title

2

**PROBLEM**

Insert Images Insert Field

Give 2 examples of the kinds of problems that header-space analysis can help detect.

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↳ Add Subquestion



**QUESTION 22**

**POINTS**

✕ Delete Question

Title

2

**PROBLEM**

Insert Images Insert Field

What makes the problem solved by MegaMIMO harder than the problem solved by multi-user MIMO?

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↳ Add Subquestion



<b>QUESTION 23</b>	<b>POINTS</b>	<b>✕ Delete Question</b>
Title	2	
<b>PROBLEM</b>		<b>Insert Images</b> <b>Insert Field</b>
<p>Explain the difference between diversity and multiplexing gain in the context of MIMO.</p> <p> ____ </p>		
↳ Add Subquestion		



<b>QUESTION 24</b>	<b>POINTS</b>	<b>✕ Delete Question</b>
Title	2	
<b>PROBLEM</b>		<b>Insert Images</b> <b>Insert Field</b>
<p>Who is in charge of implementing routing algorithms and access control policies in the Ethane system?</p> <p> ____ </p>		
↳ Add Subquestion		



<b>QUESTION 25</b>	<b>POINTS</b>	<b>✕ Delete Question</b>
Title	1	
<b>PROBLEM</b>		<b>Insert Images</b> <b>Insert Field</b>
<p>Who is in charge of implementing packet forwarding in the Ethane system?</p> <p> ____ </p>		
↳ Add Subquestion		



<b>QUESTION 26</b>	<b>POINTS</b>	
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Title 3 ✕ Delete Question

**PROBLEM**

 **Insert Images**  **Insert Field**

Could you implement DCTCP on a switch that has no support for the RED algorithm, but supports a programmable RMT pipeline? Why or why not? Please make sure to state clearly any assumptions you are making.

|\_\_\_\_|

↳ Add **Subquestion**



**QUESTION 27**

**POINTS**

✕ Delete Question

Title 2

**PROBLEM**

 **Insert Images**  **Insert Field**

Could you implement weighted fair queueing on a switch with a programmable RMT pipeline? Why or why not? Please make sure to state clearly any assumptions you are making.

|\_\_\_\_|

↳ Add **Subquestion**



**QUESTION 28**

**POINTS**

✕ Delete Question

Title 2

**PROBLEM**

 **Insert Images**  **Insert Field**

Give one advantage of packet switching over circuit switching. Give one advantage of circuit switching over packet switching.

|\_\_\_\_|

↳ Add **Subquestion**



**QUESTION 29**

**POINTS**

✕ Delete Question

Title 1

**PROBLEM**

 **Insert Images**  **Insert Field**

What is an Internet Exchange Point?

|\_\_\_\_|

↳ Add Subquestion



QUESTION 30

POINTS

✕ Delete Question

Title

3

PROBLEM

Insert Images Insert Field

How does BBR address the problem of bufferbloat?

|\_\_\_\_|

↳ Add Subquestion



QUESTION 31

POINTS

✕ Delete Question

Title

2

PROBLEM

Insert Images Insert Field

In the context of censorship circumvention, what flaw of obfs2 does obfs3 rectify?

|\_\_\_\_|

↳ Add Subquestion

+ Add Question 32

Save Assignment

### Q1

2 Points

List two explicit non-goals when the Internet was first designed.

**Q2**

3 Points

Explain how the retransmission timeout is calculated in the congestion avoidance and control paper.

**Q3**

2 Points

Weighted Fair Queueing (or really any fair queueing algorithm) is evaluated against an idealized fair queueing algorithm. Describe this idealized fair queueing algorithm.

**Q4**

2 Points

Describe the concept of isolation in the context of fair queueing algorithms.

**Q5**

2 Points

Where does XCP get a flow's round-trip time and congestion window from, given that it doesn't maintain per-flow state?

**Q6**

2 Points

If you visualize the Internet as a graph of autonomous systems, how has this graph evolved over the last few decades? Why?

**Q7**

3 Points

What is the network transfer function and what is the topology transfer function in the context of the header space analysis paper?

**Q8**

2 Points

Describe the Heartbleed vulnerability.

**Q9**

2 Points

Why did the Heartbleed paper authors have to come up with an estimate for their false negatives instead of just re-running their experiments?

**Q10**

2 Points

What is the drawback of vanilla Tor from a censorship circumvention perspective?

**Q11**

2 Points

What is the purpose of the matching algorithm in the LTEye paper?

**Q12**

2 Points

How is the unique user ID (i.e., the C-RNTI) extracted in the LTEye paper?

**Q13**

3 Points

Would Sprout work equally well in the context of the wired Internet? Why or why not?

**Q14**

4 Points

Let's say you have an AP with 2 antennas (1 and 2) sending packets  $x_1$  destined for user 1 and  $x_2$  destined for user 2---as in a classical multi-user MIMO setup. Denote the channel from AP's antenna 1 to user 2 as  $h_{12}$ , antenna 2 to user 1 as  $h_{21}$ , etc.

Let's say the channels have the following values:  $h_{11}=2$ ,  $h_{12}=4$ ,  $h_{21}=2$ ,  $h_{22}=4$ . What should  $x_1$  and  $x_2$  be multiplied by in order that user 1 and user 2 can successfully decode what they receive (i.e.,  $y_1$  and  $y_2$ ) without any interference?

**Q15**

3 Points

Explain the concept of onion routing as used in the Tor system.

**Q16**

2 Points

Explain the attack carried out by the authors of the Tor traffic analysis paper.

**Q17**

2 Points

In the full-duplex radio paper, what is self-interference cancelation?

**Q18**

3 Points

What are the 3 kinds of self-interference cancelation that the full-duplex radio paper attempts to deal with?

**Q19**

3 Points

Explain how private keys could be stolen using the Heartbleed vulnerability.

**Q20**

2 Points

What is perfect forward secrecy and how does it help in the event that a private key is stolen?

**Q21**

2 Points

Give 2 examples of the kinds of problems that header-space analysis can help detect.

## Q22

2 Points

What makes the problem solved by MegaMIMO harder than the problem solved by multi-user MIMO?

## Q23

2 Points

Explain the difference between diversity and multiplexing gain in the context of MIMO.

## Q24

2 Points

Who is in charge of implementing routing algorithms and access control policies in the Ethane system?



**Q25**

1 Point

Who is in charge of implementing packet forwarding in the Ethane system?

**Q26**

3 Points

Could you implement DCTCP on a switch that has no support for the RED algorithm, but supports a programmable RMT pipeline? Why or why not? Please make sure to state clearly any assumptions you are making.

**Q27**

2 Points

Could you implement weighted fair queueing on a switch with a programmable RMT pipeline? Why or why not? Please make sure to state clearly any assumptions you are making.

**Q28**

2 Points

Give one advantage of packet switching over circuit switching. Give one advantage of circuit switching over packet switching.

**Q29**

1 Point

What is an Internet Exchange Point?

**Q30**

3 Points

How does BBR address the problem of bufferbloat?

**Q31**

2 Points

In the context of censorship circumvention, what flaw of obfs2 does obfs3 rectify?