TCP/IP Networking 2017 Test 5

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Grading:
For each question, exactly one of the four proposed answers is correct. If the good answer and only the good answer box is crossed ⇒ +1 point. If one bad answer box is crossed and no other box is crossed ⇒ $-\frac{1}{3} = -0.333$ point. If 0 or more than 1 answer box is crossed ⇒ +0 point.
⟵ Please encode your SCIPER number here and write your full name in the box below. ↓

Name, First Name:

.....

Question 1 With TCP Reno, slow start occurs:

1. After every packet loss detected by fast retransmit.
2. After every packet loss detected by timeout.

☐ 2 and not 1. ☐ Both. ☐ None. ☐ 1 and not 2.

Question 2 Which one is always Pareto-Efficient ?

1. The maxmin fair allocation.
2. The proportionally fair allocation.

☐ Both. ☐ 1 and not 2. ☐ None. ☐ 2 and not 1.

Question 3 With TCP Reno, during slow start, as long as the slow-start threshold is not reached ...

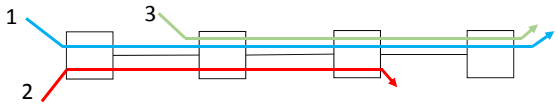
☐ The congestion window increases by 1 MSS for every non-duplicate acknowledgement received.

☐ The congestion window is multiplied by 2 for every non-duplicate acknowledgement received.

☐ The congestion window increases by $MSS \times MSS/cwnd$ for every non-duplicate acknowledgement received.

☐ The congestion window is multiplied by $\frac{1}{2}$ for every non-duplicate acknowledgement received.

Question 4
The capacities of the 3 links (shown as lines between boxes) is 3 Mb/s each. There are no constraints other than the 3 link capacities. The rates of the flows (shown as arrows) are allocated according to proportional fairness.
What is the rate allocated to flow 1 ?



- ☐ 0.5 Mb/s.
- ☐ $\frac{2}{3}$ Mb/s.
- ☐ 1 Mb/s.
- ☐ 2 Mb/s.

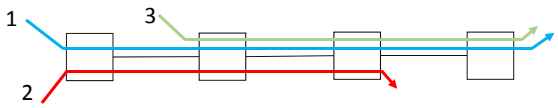
Question 5 Two long-lived TCP connections use TCP Reno without ECN and have the same network path but different RTTs. The hosts using these connections are very fast so that the rate of each connection is limited by the state of the network path.

- ☐ The connection with a larger RTT gets a larger throughput.
- ☐ Both connections obtain the same throughput because TCP Reno implements a form of utility fairness when ECN is not used.
- ☐ Both connections obtain the same throughput because they have the same loss rate.
- ☐ The connection with a larger RTT gets a smaller throughput.

Question 6 When is a TCP Cubic connection expected to have a larger throughput than a TCP Reno connection ?

- ☐ Whenever ECN is used and the connection does not experience any congestion loss.
- ☐ When the bandwidth-delay product is small.
- ☐ When the bandwidth-delay product is large.
- ☐ Whenever IPv6 is used.

Question 7 The capacities of the 3 links (shown as lines between boxes) is 3 Mb/s each. There are no constraints other than the 3 link capacities. The rates of the flows (shown as arrows) are allocated according to max-min fairness.
What is the rate allocated to flow 1 ?



- ☐ 1 Mb/s.
- ☐ 0.5 Mb/s.
- ☐ $\frac{2}{3}$ Mb/s.
- ☐ 2 Mb/s.

Question 8 A non-ECN long-lived flow uses TCP Reno and experiences a packet loss probability q. Its round trip time is T and segment size is L. Which of the formulas below gives its throughput θ (where C is some numerical constant) ?

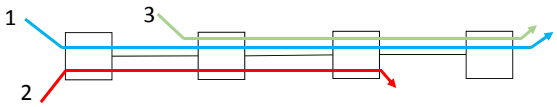
- ☐ $\theta = \frac{CL}{Tq}$.
- ☐ $\theta = \frac{CL}{T\sqrt{q}}$.
- ☐ $\theta = \frac{CT}{Lq}$
- ☐ $\theta = \frac{CT}{L\sqrt{q}}$.

Question 9 Consider a dynamic rate allocation mechanism which uses additive increase and multiplicative decrease. Which of these moves improve the fairness of the rate vector ?

1. Additive Increase.
2. Multiplicative Decrease.

☐ 1 and not 2. ☐ None. ☐ 2 and not 1. ☐ Both.

Question 10 The capacities of the 3 links (shown as lines between boxes) is 3 Mb/s each. There are no constraints other than the 3 link capacities. We consider the following two allocations, where x_i is the rate of flow i, $i = 1, 2, 3$. Which ones are Pareto-efficient ?



1. $x_1 = 1$Mb/s, $x_2 = 1$Mb/s, $x_3 = 1$Mb/s.
2. $x_1 = 0.5$Mb/s, $x_2 = 1.25$Mb/s, $x_3 = 1.25$Mb/s.

☐ 1 and not 2. ☐ None.
☐ Both. ☐ 2 and not 1.