First Third-Term Exam

⊕ *Do not forget to write your name on the first page. Initial each subsequent page.*
⊕ *Be* **neat** *and* **precise**. **I will not grade answers I cannot read.**
⊕ *You should draw simple figures if you think it will make your answers clearer.*
⊕ *Good luck and remember, brevity is the soul of wit*

- All problems are mandatory

- I cannot stress this point enough: **Be precise**. If you have written something incorrect along with the correct answer, you should **not** expect to get all the points. I will grade based upon what you **wrote**, not what you **meant**.

- Maximum possible points: 50.

Name: _____

Problem	Points
1	
2	
3	
4	
5	
Total	

1. Nomenclature

   (a) Describe the following terms: (2 points each)

       - Latency

       - Autonomous System

       - Split Horizon

       - ARP

       - Multi-Exit Discriminator

2. Routing

    (a) How is the time-to-live information used in Link State routing? (3 points)

    (b) What is the run-time complexity of Dijkstra's algorithm? Make sure you define your terms. (2 points)

    (c) A Distance Vector routing implementation may choose to keep all routes to a destination (i.e., keep the full table) or only the current best next hop information. Does the latter require extra protocol mechanisms? Explain with an example. (5 points)

3. IP Service Model, Addressing

    (a) Specify the procedure by which a host can ascertain that it has received all fragments belonging to a single IP datagram. (3 points)

    (b) What specific problem do subnets solve? (2 points)

    (c) Suppose you've been allocated 200.0.0.0/20, and you split your addresses into four equal size subnets. Give the network addresses (also known as subnet ID or subnet number) corresponding to your subnets. (2 points)

    (d) Can IP be used over a non-broadcast link layer protocol? What protocols (IP, BGP, OSPF, ARP RIP, none) would have to change? Explain. (3 points)

4. CIDR, BGP

   (a) Describe two problems with class-based address allocation that CIDR addresses. (2 points)

   (b) How are default routes specified in CIDR notation? (1 point)

   (c) What routing table entry do stub domain routers use for forwarding packets to addresses outside their own AS? How is this route installed? (2 points)

   (d) Consider a stub AS that default routes to a single network provider. Within the domain, what is the next hop for the default route at hosts, at interior routers and at the border router? (5 points)

BGP

5. (a) Describe two features that distinguish BGP from OSPF (or other IGP we have considered). (2 points)

(b) Suppose a multi-homed AS (named D) has two upstream providers, A and B. How can D's adminstrator configure her BGP protocol/advertisements such that packets always exit D via A and always come in to D via B? (3 points)

(c) How can the advertisements be changed such that packets come in to D via B but fail over to use A if somehow there is a failure involving B (either B is not reachable or the D to B link has failed?) (3 points)

(d) How should the routing within D be configured such that packets exit using the closest egress (either A or B)? (2 points)