

HW4

1.
 - a. To prevent wastage of IP addresses, the company should use **class C** addressing. Class C has $2^8 - 2 = 254$ host addresses. $4000/254 = 15.75$
So, **16 networks** would be required. $(16 * 254) - 4000 = \mathbf{64 \text{ wasted addresses}}$.
 - b. With classless addressing, the minimum we would need to get to 4000 is $2^{12} = 4096$. So, **12 bits** will be required for the host part. **20 bits** will be the network part of the address. Out of 4096, only 4094 will be usable IP addresses. So $4096 - 4000 = \mathbf{96 \text{ Addresses will be wasted}}$.

2.

	A	B	C	D	E	F
A	0	∞	∞	∞	∞	∞
B	0	2	∞	1	∞	∞
C	0	2	∞	1	4	∞
D	0	2	3	1	4	∞
E	0	2	3	1	4	5
F	0	2	3	1	4	5

dist.		shortest path:	
A to D	1	A to B	$A \rightarrow B$
A to B	2	A to C	$A \rightarrow B \rightarrow C$
A to C	3	A to D	$A \rightarrow D$
A to E	4	A to E	$A \rightarrow D \rightarrow E$
A to F	5	A to F	$A \rightarrow B \rightarrow C \rightarrow F$

3.

- a. RIP uses a distance vector algorithm to calculate the best path to route through, while OSPF uses Shortest Path First. The maximum hop count for RIP is 15 while OSPF is unlimited. RIP is better for smaller networks while OSPF is better for larger ones. RIP has to stop different types of loops from happening in the network, while OSPF doesn't have to worry about this since it implements Shortest Path First.
- b. Intra-AS routing protocols are used to configure, maintain, and synchronize information within an AS. They are not used for communication outside of the single AS in which they reside. RIP and OSPF are examples of Intra-AS routing protocols. Inter-AS routing protocols, like BGP, are used to create routing policies for managing the networks of different organizations connected to the Internet.
- c. RIP is a proactive routing protocol while DSR is considered reactive. In RIP, routing information is propagated through the network periodically while DSR only propagates information when it is needed. In DSR, there is a reduced overhead for routing compared to RIP, but these differences result in DSR having a slower response time.

4.

- a. 192.168.0.0/24
- b. 192.168.0.255
- c. 192.168.0.1 - 192.168.0.254
- d. 192.168.0.0/27
- e. 192.168.0.1 - 192.168.0.30
- f. 192.168.0.31
- g. 8 subnets
- h. 30 hosts per subnet since 240 hosts. ($240/8 = 30$)