1. Jill has two SOHO routers – an old router with quality firewall features that she has used for a number of years, and a new router that includes wireless networking but has limited firewall features. Both routers include 4 port fast Ethernet switches. The wireless router also bridges between wireless and wired networking so that devices attached to the fast Ethernet ports can access wireless devices and vice-versa.

Both routers include a dedicated fast Ethernet port for WAN (Internet) connection. Routing is applied to traffic passing between the external Internet port and the internal switch (bridge) that is part of the LAN. Both routers support NAT and DHCP. It is possible to disable DHCP service on either or both routers, and it is possible to configure either or both routers to operate using RIP. It may also be possible to disable NAT on either or both routers.

Discuss the various ways that Jill could use both SOHO routers together. Which configurations allow Jill to retain the firewall capabilities of the old router to protect her LAN? Which configurations allow full access for wireless devices to wired LAN computers and vice-versa? If Jill believes that the new SOHO router is not capable of handling all her LAN’s Internet traffic, is there a configuration that allows her to still have wireless access to the Internet and full LAN access? What would be the default gateway router in each case for wireless PC’s, and wired PC’s?

2. What is accomplished by attaching a message authentication code to an IPSec packet?

3. What is accomplished by encrypting the contents of an IPSec packet?

4. Why does a security association contain the following parameters?
   a. Sequence number counter
   b. Sequence counter overflow flag
   c. Anti-replay window
   d. Lifetime of the security association
   e. Path MTU
   f. AH authentication algorithm, keys, etc
   g. ESP encryption algorithm, keys, initialisation vector, etc
   h. ESP authentication algorithm, keys, etc

5. Why is the migration to IPv6 important for the future of the Internet?

6. IPv6 has no ARP. How does it find out the MAC address for a given IP address?
7. IPv6 has no broadcast capability. How does it broadcast packets to the local network as required by some protocols?

8. Compare basic NAT with ‘PAT’ NAT. What are the advantages of basic NAT? What are the advantages of ‘PAT’ NAT?

9. When purchasing a SOHO firewall router, which of the following features do you think would be desirable and why?
   
   a. Packet filtering
   b. Application gateway
   c. Stateful packet inspection
   d. Deep packet inspection
   e. VPN passthrough
   f. VPN endpoint

10. Why is it natural to combine NAT and firewall functionality together in one device? What capabilities can be used by both functionalities? In what ways can either functionality benefit the other?