

# Review for Final

Of content that came after the midterm

# Final Exam Overview

- Thursday 12/11 2:30 - 4:20PM
- **Bring your router**, its power supply, ethernet cord, etc
- Closed book
- Calculators encouraged (nothing fancy)
- Essay questions
- Don't Cheat

# Final Exam Overview

- Material not mentioned in the lectures will not appear
- Exam weighted towards post-midterm material
- 25% pre-midterm, 75% post-midterm
- You are responsible for Chapters 1-6, 8, 9
- Subsections of interest for post-midterm content:  
4.3; 5.1,2; 6.1,2,3; 8.1,2,3,4,5; 9.1,4

# TCP (part3)

- Nagle's Algorithm, Delayed acknowledgements
- Congestion and fairness
  - Implicit congestion feedback
  - Slow start
  - AIMD
  - Fast retransmit, Fast recovery

# Inter-domain Routing

- Hierarchical addressing and Route aggregation
- IP forwarding based on Prefix matching
- Autonomous System (AS) structure of Internet
  - Hierarchy and coordination through border routers
  - AS relationships (Peer, Provider, Customer), router export policies
  - Inter-domain (AS) paths (quality vs. price)
  - BGP-4
  - Multi-homing

# DNS

- Problems with using HOSTS.TXT
- DNS hierarchy, namespace distribution
  - Query/Response protocol
  - Recursive and Iterative lookups
  - Bootstrapping
  - Caching
  - DNS resource records (RR)
  - DNS' vulnerability to attack

# HTTP

- Request\Response protocol
- Why is HTTP 1.0 performance so bad?
  - Interplay between TCP mechanisms and HTTP
- How does HTTP 1.1 improve things?
- Caching

# Security (I)

- Security threats
  - Application vulnerabilities
  - ICMP attacks
  - TCP attacks
  - DNS attacks
  - Routing attacks
  - DoS attacks
- Firewalls, Network/App-layers security
  - Flow reconstruction in firewalls

# Security (2)

- Network security goals and threats
- Encryption
  - Key integrity (message auth codes)
  - Challenge\Response authentication
  - Encrypting large messages (chaining)
  - Public Key Encryption
    - For establishing sessions keys
    - Distribution (PKI, X.509), Revocation
    - Kerberos, Message Digests
  - PGP, SSL/TLS, IPSEC

# Privacy

- Anonymizing proxies
- MIX nets
- Tor (onion routing)
- SlyFi (you don't have to know protocol details)

# Peer-to-Peer Systems

- Benefits of P2P Systems
- Challenges for designing P2P Systems
- Napster, Gnutella and BitTorrent high-level protocol details
- Why are incentives necessary for P2P systems to be successful?
- BitTorrent tit-for-tat incentives strategy