ID Number:	Mark:
Last Name:	
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CMPUT 313, Winter 2001, Final Examination (B2)

April 25th, 2001

This is an closed book exam. All questions have equal weights and must be answered in whatever space is available on this form. Percentages indicate the relative weight of subquestions. No additional sheets are allowed. To receive full marks present all intermediate steps. If necessary, state any additional assumptions that you made. The exam is marked out of 38 which is the percentage of its contribution to the final mark. All questions carry an equal weight. You have five days to contest your mark from the day the grades are announced.

[1] In certain protocols, the CRC covers only the header bits but not the payload. Justify why this may be a reasonable approach and under what circumstances. (30%) Consider the data 00100100 and the generator polynomial $G(x)=x^3+x+1$, indicate what will be the transmitted message. (40%) How should the transmitted message be modified to introduce a four bit error that will be undetectable by the given CRC generator polynomial? (30%)

[2] How does TCP implement flow control (to deal with limited receiver buffer)? (30%) What is slow start? (40%) What is fast retransmit? (30%)

[3] Why is it necessary for an Ethernet frame to include at least 46 bytes of payload? (50%) Name two reasons why the Ethernet MAC addresses are not considered appropriate for Internet-wide routing. (50%)

[4] Is fragmentation necessary in Virtual Circuit networks? Explain. (50%) Describe at least two possible conditions that result in failure of reassembly of a fragmented packet in datagram fragmentation (assume fragmentation in the style of IP). (50%)

[5] In the analysis of Go-Back-N, we have assumed that the acknowledgments are not corrupted. Assume now that the acknowledgments can be corrupted too. Derive a formula for the efficiency of Go-Back-N if the data frame error probability is P_{data} and the ACK frame error probability is P_{ACK}

[6] A fancy way of routing packets is based on the geographic location of the destination. In a fictitious Internet (consisting only of wired nodes) the packet not only includes the address of the destination, but also an indication as to where the destination is located in geographic terms. The routers, instead of looking at the destination address look only at the geographic location information of the sender. They subsequently send the packet to their neighboring router that it is geographically closer to the destination. Does this scheme work or not and why? (50%) Assuming

the following CIDR networks are aggregatable: 200.96.86.0/24, 200.96.87.0/24, 200.96.88.0/24, 200.96.89.0/24, what is their aggregate network address/mask? [Note the /24 is shorthand for a mask that spans the first 24 bits of the address (i.e. the 24 most important bits.] (50%)

[7] A network uses a slotted ALOHA protocol and the data rate of the channel is 56 kbits/sec. A total of N stations are present in the system. On the average each node transmits a packet of 1000 bytes every 60 seconds. A new packet is generated at a station even if the previous one has not yet been sent (i.e., the stations are buffered). What is the maximum value of N? (slotted ALOHA throughput: $S=Ge^{-G}$)

[8] The following figure represents a network consisting of links. The links are annotated by their corresponding costs. Carefully illustrate how Dijkstra's algorithm will progress starting from node A. At each iteration make sure you present (a) the permanent set of vertices, (b) the tentative set of vertices, (c) the correct costs, underlining the vertex to be admitted to the permanent set in the next iteration.