

[4 marks] Fill in the blanks in the following sentences.

- Two forms of malicious software that a computer connected to the Internet may be subject to unauthorised attack from are spyware/Trojanhorse/worm/virus
- Two forms of security protection that might be installed to protect a computer from malicious software attacks are firewall/spam filter/proxy server/anti-virus software/encryption

- [3/15] Internet software has four layers of routines, the *application layer* is one such layer, the other three are:

Transport Layer

Network Layer

Link Layer

- [2/15] In terms of combining networks, the difference between a *switch* and a *router* is A switch connects together 2 or more buses  
A router connects together 2 or more networks  
that may be of different types

- [2/15] Name four types of network topology

fully connected

ring

star

bus

tree

## An Example Problem

- Person A is asked to determine the ages of Person B's 3 children
- B tells A that the product of the 3 ages is 36
- A tells B that this is not enough information
- B tells A the sum of the 3 ages
- A tells B that this is not enough information
- B tells A that the oldest child plays piano
- A tells B the ages of the children
- How old are the 3 children??

## An Example Problem

(a) Triples whose product is 36

(1,1,36) (1,6,6)

(1,2,18) (2,2,9)

(1,3,12) (2,3,6)

(1,4,9) (3,3,4)

## An Example Problem

(b) Sums of triples from part (a)

$$1+1+36=38 \quad 1+6+6=13$$

$$1+2+18=21 \quad 2+2+9=13$$

$$1+3+12=16 \quad 2+3+6=11$$

$$1+4+9=14 \quad 3+3+4=10$$

## Another Example Problem

- Before A, B, C, and D had a race, they made the following predictions:
  - A predicted that B would win
  - B predicted that D would be last
  - C predicted that A would be 3<sup>rd</sup>
  - D predicted that A's prediction would be correct
- Only one prediction was true
- This prediction was made by the winner
- In what order did they finish?

## Another Example Problem

- The predictions of A and D are equivalent
- Must be both false as only one correct prediction
- So neither A or D was the winner as the winner's prediction was correct
- B did not win as A's prediction was false
- C is the winner
- C's prediction was true so A was third
- B's prediction is false so D came 2<sup>nd</sup>
- The finishing order is therefore CDAB

## Yet Another Example Problem

- As you step onto a boat, your hat falls in the river
- The river is flowing at 5 Km/h
- So the hat flows downstream
- You begin travelling upstream
- You travel at 9.5 Km/h relative to the water
- After 10 minutes, you realise you have lost your hat
- You turn around and go to retrieve it
- How long is it before you catch up with your hat?

## Yet Another Example Problem

- Is this as difficult as it seems ?
  - Imagine you are not on the water but on a conveyer belt
  - What's the solution if the belt is switched off?
  - Does switching it on make any difference?