Digital Communication II

(a) Explain the rôle of the checksum mechanisms in OSI layers 2, 3 and 4 of the Internet Protocols. [9 marks]

(b) An ARM assembly code implementation of the IP/TCP checksum function appears below. Annotate this with comments that explain the code.

```
sub r3, r3, #16
loop:
  ldmia r2!, {r6-r9}
  adds r4, r4, r6
  adcs r4, r4, r7
  adcs r4, r4, r8
  adcs r4, r4, r9
  adcs r4, r4, #0
  adc r4, r4, #0
  subs r3, r3, #16
  bxx loop
add r3, r3, #16
```

[6 marks]

(c) `traceroute` is a commonly used diagnostic tool in the Internet. Explain how it works, making reference to its use of the TTL Expiry facility of ICMP, and the circumstances under which it might generate misleading or incorrect output. [5 marks]