

4 Operating Systems (rmm1002)

- (a) Describe the mechanisms by which an operating system protects a user process' use of system resources (CPU, memory, IO) from accidental or deliberate interference by other processes. Indicate what special hardware, if any, is required for each mechanism. [6 marks]
- (b) Inter-Process Communication (IPC) requires that two processes on the same host can somehow share information directly. Why does this require special support in the operating system? Compare the following IPC mechanisms in terms of how easily they support interaction between processes: *UNIX signals*, *pipes*, *named pipes*. [6 marks]
- (c) In UNIX, files are usually protected using *access control lists*, with the access control check carried out when the file is opened. What would be the trade-off if the access control check were instead performed when the file was written or read? Describe how you might implement a capability system to protect files from access, give a possible API, and compare your proposal to the UNIX access control method. [8 marks]