Compiler Construction

(a) In a stack-based runtime system, what problem does the static link method attempt to solve, and how does it work? [4 marks]

(b) Can static linking be used to implement a language with first-class functions? If yes, then explain how. If no, give an example and explain how static linking fails. [6 marks]

(c) Explain how exceptions (ML-like raise and handle) could be implemented with a stack-oriented machine. [5 marks]

(d) A program may evaluate to an exception that has been raised all the way to the top-level and never handled. Discuss how you might modify your implementation in part (c) to dump debugging information when such top-level exceptions are raised. The debugging information should include some description of the state of the computation just before the top-level exception was raised. [5 marks]