EEEN 301 Assignment 2 May 2023

Name: **Student ID:**

Instructions:

Attempt all questions.

You should reference at least your notes, lab work, Exploring Beaglebone by Derek Molloy, and Understanding the Linux Kernel, 3rd Edition, O'Reilly Media, to answer the questions in this assignment.

Your answers should be neatly typed and submitted as a **pdf** on the ECS submission system by **Sunday 4th June 23:59**.

The assignment consists of 10 questions. A total of 60 Marks.

1. List three common Linux shell commands, describe what each of the commands does?

   [6 Marks]
2. Describe, in your own words, the 4 major components of an embedded Linux system.

   [8 Marks]
3. What are the ARM Linux access modes and how do they differ between user space and kernel space?

   [4 Marks]
4. How does your answer in Q3 relate to memory access?

   [6 Marks]
5. You've compiled a Linux kernel driver for kernel version 3.1 what versions of the kernel should you use it on?

   [1 Mark]
6. What elements are required to implement interrupts in a Loadable Kernel Module (LKM) on the Beaglebone Black?

   [4 Marks]
7. Interrupt requests are said to be divided into two halves. What are the two halves, what does each half do?

   [4 Marks]
8. What does the acronym PCIe stand for? Give an overview of how this interface works and how it uses the advantages of both parallel and serial communications.

   [5 Marks]
9. For each of the following distances, suggest how you would transmit data at the highest possible bandwidth: 20mm, 0.5m, 10km. Please also justify your selection.

   [6 Marks]
10. In the lab, we discussed the implementation of a kernel module for a UART serial port. Describe how we could store modifiable module parameters in our driver, such as the UART baud rate? What could the structure of these module parameters look like? How could we view and alter them from user space? How could we handle changing the module parameters while the kernel driver is loaded?

    [16 marks]