

Quiz 1

Allotted time: 45 minutes

Instructions:

- There are two questions with sub-parts, printed over two sides of a sheet.
- Discussions amongst the students are not allowed. Any dishonesty shall be penalized heavily
- Be clear in your arguments. Vague arguments shall not be given full credit.

1. Consider a 5-bit floating-point representation based on the IEEE floating-point format, with one sign bit, two exponent bits ($k = 2$), and two fraction bits ($n = 2$).

(a) Compute the bias.

(b) Compute e , E , f , M and the fractional value for each of the following 5 bit floating point representations: 0 00 01, 0 00 11, 0 01 10, 1 01 11, 0 10 01 and 0 01 00.

e	:	The value represented by considering the exponent field to be an unsigned integer
E	:	The value of the exponent after biasing
f	:	The value of the fraction
M	:	The value of the significand
$2^E \times M$:	The (unreduced) fractional value of the number

- (c) Compute the value of the smallest normalized number and the largest denormalized numbers under the given 5-bit floating point representation.

[2 + (6 x 5 x 0.5) + 3 marks]

2. The following (uncommented) assembly code was modified from what was discussed in class.

```
.factorial:
    cmp r0, 1
    beq .return
    bgt .continue
    b .return
.continue:
    sub sp, sp, 8
    st r0, [sp]
    st ra, 2[sp]
    sub r0, r0, 1
    call .factorial
    ld r0, [sp]
```