

Question 3 (12 points):

```
25 # lumiptr:
26 # parameters:
27 #   $a0: screen address
28 #   $a1: R (number of rows)
29 #   $a2: C (number of columns)
30 lumiptr:
31     mul  $t1, $a1, $a2    # $t1 <- R*C
32     add  $t1, $a0, $t1    # $t1 <- screen + R*C
33     add  $v0, $0, $0      # luminosity <- 0
34 next_p:
35     lbu  $t2, 0($a0)      # $t2 <- pixel
36     add  $v0, $v0, $t2    # lumens <- lumens + pixel
37     addi $a0, $a0, 1      # p++
38     bne  $a0, $t1, next_p
39     jr   $ra
```

Figure 1: The code for `lumiptr`.

1. (7 points) What is the binary representation, expressed in hexadecimal, for the `bne` instruction `bne, $a0, $t1, next_p` in line 38 of `lumiptr` in Figure ???
2. (5 points) The code to save/restore register values is omitted from `lumiptr`. Is it necessary for `lumiptr` to save/restore any register values, which ones? Explain your answer.