

1. (a) (2 points) For the following four numbers given in decimal or hexadecimal notation, write the corresponding binary number using the indicated format.

$(-48)_{10}$ using 8-bit sign magnitude: $(1011\ 0000)_2$

$(155)_{10}$ using 8-bit unsigned: $(1001\ 1011)_2$

$(-28)_{10}$ using 8-bit two's complement: $(1110\ 0100)_2$

$(BA)_{16}$ using 8-bit unsigned: $(1011\ 1010)_2$

- (b) (3 points) State whether the following statements about the binary representation of numbers are *true* or *false*. Give **brief** explanations for the statements that are *false*.

- Both two's complement and sign/magnitude representation can be used to represent negative numbers in binary.

Solution: True, however it is more difficult to design arithmetic circuits that work with sign/magnitude format. Still they are used.

- Using N bits it is possible to represent 2^N different numbers when a sign/magnitude number system is used.

Solution: False, 0 is represented twice.

- While there are methods to represent both positive and negative integers, it is not possible to represent fractions or real numbers using binary numbers.

Solution: False, fixed and floating point number systems can be used to represent such numbers.