Assignment 3

Questions

Q1. (3 points)

Prove or disprove that the product of any even integer and any integer is even.

Q2. (3 points)

A prime number is an integer greater than 1 whose only factors are 1 and itself. Consider the following statement: If a number is prime, then the number is either odd or 2. Prove it by **contraposition.**

Q3. (3 points)

Prove the following claim using mathematical induction:

For every natural number *n*, we have

$$2 \cdot 2 + 3 \cdot 2^2 + 4 \cdot 2^3 + \cdots + (n+1) \cdot 2^n = n \cdot 2^{n+1}.$$

Q4. (4 points)

1) Convert the following decimal number to hexadecimal number.

$$(51966)_{10}$$

2) Convert the following fractional number to hexadecimal number.

$$(173.53125)_{10}$$

Q5. (3 points)

Find the 5th roots of

$$\left(-\frac{1}{\sqrt{2}}(1+\sqrt{3}i)\right)^9 + 16\sqrt{2}i$$

Q6. (4 points)

Use 8-bit 2's complement to perform

1)

$$(35)_{16} - (62)_{16}.$$

2)

$$(-89)_{10} - (53)_{10}$$

And determine if the results are correct.

Q7. (4 points)

Convert the following 2 numbers to IEEE 754 floating point 32-bit format, and perform the subtraction:

$$\mathbf{(12.75)_{10} - (18.5)_{10}}$$