CS 130 Homework 4

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The following problems are taken from exercises at the end of Sections 2.1 and 2.2 of Gersting, 6e.

$\boxed{1}$ (Section 2.1, Exercise 4) Provide counterexamples to the following statements:

    a. The number n is an odd integer if and only if $3n + 5$ is an even integer.

    b. The number n is an even integer if and only if $3n + 2$ is an even integer.

$\boxed{2}$ (Section 2.1, Exercise 12) Give a direct proof of the statement:

$$\text{The sum of even integers is even.}$$

$\boxed{3}$ (Section 2.1, Exercise 13) Give a proof by contradiction of the statement:

$$\text{The sum of even integers is even.}$$

$\boxed{4}$ (Section 2.1, Exercise 21) Give a proof by contraposition of the statement:

$$\text{If a number } x \text{ is positive, so is } x + 1.$$

$\boxed{5}$ (Section 2.1, Exercise 50) Prove or disprove the following statement:

$$\text{The sum of any three consecutive integers is even.}$$

$\boxed{6}$ (Section 2.1, Exercise 59) Prove or disprove the following statement:

$$\text{For every positive integer } n, \ 2^n + 1 \text{ is prime.}$$

$\boxed{7}$ (Section 2.2., Exercise 7) Prove that for $n \geq 1$, the following is true:

$$\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$$

$\boxed{8}$ (Section 2.2., Exercise 51) Prove that for $n \geq 1$, $n^3 - n$ is divisible by 3.