Kerry Ojakian's CSI 35 Class
Class Assignment #1

1. Consider summing two odd integers. What is your conjecture about the result? (even or odd or something else?) Prove it.

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2. Prove that the product of any two consecutive integers is even.

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3. Prove or disprove: If n is an odd integer then $\frac{n-1}{2}$ is odd.

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4. Prove that for all positive integers n, n^3 is odd if and only if n is odd.

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5. Prove that the product of any 3 consecutive positive integers is divisible by 3.

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6. Prove that for all positive integers n, n^2 is odd if and only if n is odd.

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7. Prove that if $A|B$ and $B|C$, then $A|C$.

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8. One of the following is true, and the other false (notice they are converses of eachother). Find a counter-example to the false claim, and prove the true one.

   (a) If $ab|c$, then both $a|c$ and $b|c$.

   (b) If both $a|c$ and $b|c$, then $ab|c$.

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9. Prove or disprove: If $a|b$ then $a^2|b^2$.

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10. Prove that 20 is *not* a perfect square (use cases).

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11. Prove that if x and y are integers and xy is even, then x is even or y is even (Hint: Use Proof-by-Contradiction)

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12. Consider the following program:

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if x > 5 :
    z = x + 1
else:
    z = x − 1
```

Suppose the initial assertion is that $x = 3$. Determine what the final value of z will be, and prove it.

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13. Consider the following program:

```
for x in range(1, 1000):
    y = y + 3
```

Given that the initial value of y is even, prove that the final value is odd.

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14. Consider the following program:

```
a = 1
while a > 0 :
    a = a + 1
```

Prove that the program does *not* terminate.
