Name: _____

Math 236 Exam 1

- Print your name clearly in the space provided.
- You may use your textbook and class notes only.
- You may not consult with anyone other than me.

Honor Statement:

I have neither given nor received help on this exam, and all of the answers are my own.

_____

Signature

Question	Points	Score
1	12	
2	20	
3	14	
4	8	
5	14	
6	20	
7	12	
Total:	100	

1. [12 points] Show that $P \Rightarrow [Q \wedge R]$ if and only if $(P \Rightarrow Q) \wedge (P \Rightarrow R)$.

2. [20 points] Prove that an integer n is odd if and only if n^3 is odd.

3. [14 points] Prove that if $x + y$ is irrational, then either x is irrational or y is irrational.

4. [8 points] Write out "if-then" statement(s) that need to be proved in order to prove the following:

   A map of CW complexes $f\colon X \to Y$ is a homotopy equivalence if and only if $f_*\colon \pi_i(X) \to \pi_i(Y)$ is a group isomorphism for all i.

5. [14 points] Which of the following is equal to the set $\{x \in \mathbb{R} : x(x+2)^2(x-\frac{3}{2}) = 0\}$?
   (a) $\{-2, 0, 3\}$

   (b) $\{\frac{3}{2}, -2, 0\}$

   (c) $\{-2, -2, 0, \frac{3}{2}\}$

   (d) $\{-2, 3\}$

   Justify your answers.

6. Prove or give a counterexample to each of the following.
   (a) [10 points] If $A \cap C \subseteq B \cap C$, then $A \subseteq B$.

   (b) [10 points] If $A \cup C \subseteq B \cup C$, then $A \subseteq B$.

7. [12 points] Show that $A = (A \backslash B) \cup (A \cap B)$.