Math 299 **Homework Assignment 3** **Due 9/8**

2.26 A student makes the following statement:

P: *If I don't see my advisor today, I will see her tomorrow.*

Determine which of these statements is certainly false, given that the statement P is true.

(i) The student doesn't see his advisor either day.

(ii) The student sees his advisor both days.

(iii) The student sees his advisor on one of the two days.

(iv) The student doesn't see his advisor today and waits until next week to see her.

2.28 Consider the statement (implication):

If Bill takes Sam to the concert, then Sam will take Bill to dinner.

Which of the following implies that this statement is true?

(a) Sam takes Bill to dinner only if Bill takes Sam to the concert.

(b) Either Bill doesn't take Sam to the concert or Sam takes Bill to dinner.

(c) Bill takes Sam to the concert.

(d) Bill takes Sam to the concert and Sam takes Bill to dinner.

(e) Bill takes Sam to the concert and Sam doesn't take Bill to dinner.

(f) The concert is canceled.

(g) Sam doesn't attend the concert.

2.32 In each of the following, two open sentences $P(x)$ and $Q(x)$ over a domain S are given. Determine all $x \in S$ for which $P(x) \implies Q(x)$ is a true statement.

(a) $P(x) : x - 3 = 4$; $Q(x) : x \geq 8$; $S = \mathbb{R}$.

(b) $P(x) : x^2 \geq 1$; $Q(x) : x \geq 1$; $S = \mathbb{R}$.

(c) $P(x) : x^2 \geq 1$; $Q(x) : x \geq 1$; $S = \mathbb{N}$.

(d) $P(x) : x \in [-1, 2]$; $Q(x) : x \leq 2$; $S = [-1, 1]$.

2.34 (a,b,e,f) Each of the following describes an implication. Write the implication in the form "if ..., then ...".

(a) Any point on the straight line with equation $2y + x - 3 = 0$ whose x-coordinate is an integer also has an integer for its y-coordinate.

(b) The square of every odd integer is odd.

(e) Let C be a circle of circumference 4π. Then the area of C is also 4π.

(f) Let $n \in \mathbb{Z}$. The integer n^3 is even only if n is even.