

MthSc 119, Assignment 2 — Model Solutions

2.1 (a) If x is an odd integer and y is an even integer, then xy is even. (b) If x is an odd integer, then x^2 is also odd. (d) If x is a negative integer and y is a negative integer then xy is negative.

2.2 Let A: a is a prime, B: $a > 1$. The statement “if A then B” is true; however “if B then A” is false, since $a = 4$ makes B true and A false.

2.3 Statement (a) is only false when A is true and B is false. Statement (b) is false only when (not A) and B are both false; that is, A is true and B is false. Thus statements (a) and (b) are simultaneously both true or both false — they are equivalent.

2.4 Statement (a) is true unless A is true and B is false. Statement (b) is true unless (not B) is true and (not A) is false. This is the same as B is false and A is true. Thus (a) and (b) are true under exactly the same situations, and therefore make the same assertion.

2.7 Let r be the radius of the sphere. Let one side of the triangle comprise a segment of length $\frac{1}{2}\pi r$ of a circle of radius r on the sphere. The endpoints of this segment will be two of the vertices of the triangle. Let the third vertex be a point of largest possible distance from this circle. Then $a^2 = b^2 = c^2 = \frac{\pi^2 r^2}{4}$, so $a^2 + b^2 \neq c^2$. This is not a violation of the Pythagorean theorem because the Pythagorean theorem applies only to triangles on the *plane*.

2.8 This is true. Indeed it is vacuously true because guinea pigs don't have tails!