p. 49: #3cf, 12cd; p.60: #1bd, 4ab.

p.49: #3(c) If $x^2$ is not divisible by 4, then $x$ is odd.
**Pf.** Suppose $x$ is even. Then $x = 2k$ for some integer $k$, so that $x^2 = 4k^2$ is divisible by 4. Thus, if $x^2$ is not divisible by 4, then $x$ must be odd.\#

(f) If $xy$ is odd, then both $x$ and $y$ are odd.

**Pf.** Suppose $x$ and $y$ are not both odd. The one or both of them is even. In this case, $xy$ is even. Thus, if $xy$ is odd, then both $x$ and $y$ must be odd.\#

# 12. (a) C (proof shows that $m^2$ even implies $m$ is even).
(c) C (proof assumes the conclusion that $x + y$ is even when $x$ and $y$ are even).

p.60: #1(b) **Pf.** Let $m = 1, n = -1$. Then $15m + 12n = 3$. \#

(d) **Pf.** Suppose integers $m, n$ can be found that satisfy $12m + 15n = 1$. Then the left hand side is divisible by 3, whereas the right hand side is not. Since this is a contradiction, there can be no integers satisfying $12m + 15n = 1$. \#

4. (a) $x = 41$ counterexample.

(b) **Pf.** Let $x \in \mathbb{R}$. Then, letting $y = -x$, we have $x + y = 0$. \#