**Math 270 - Basic Discrete Mathematics**
**Practice Quiz on Section 4.1**
Solutions

**Directions:** Answer the problems given below.

**1.** Assume that $m$ and $n$ are particular integers.

**a.** Is $4m + 7$ odd? Why or why not?

Yes: $4m+7 = 4m+6+1$
$= 2(2m+3)+1$,
and $2m+3$ is an integer by closure.

**b.** Is $8m - 10n$ even? Why or why not?

Yes: $8m-10n = 2(4m-5n)$,
and $4m-5n$ is an integer by closure.

**c.** Assuming that $m > 1$, is $m^2 + 4m + 4$ composite? Why or why not?

Yes. $m^2+4m+4 = (m+2)^2 = (m+2)\cdot(m+2)$.
Since $m>1$, $m+2>1$, so $(m+2)^2 > (m+2)$.
Letting $q=(m+2)^2$, $r=m+2$, $s=m+2$, we have
$q=rs$, $1<r<q$, $1<s<q$, so $q$ is composite.

**2.** Prove the following statement: There exist real numbers $x$ and $y$ such that

$$\sqrt{x+y} = \sqrt{x} + \sqrt{y}.$$

Proof: Let $x=0$, $y=0$. Since $0 \in \mathbb{R}$,
$x$ and $y$ are real, and
$\sqrt{x+y} = \sqrt{0+0} = \sqrt{0} = 0 = \sqrt{0}+\sqrt{0} = \sqrt{x}+\sqrt{y}$. ∎