Discrete Mathematics
Week 5

Abeyah Calpatura

4.1

Exercises

Abeyah Calpatura
#7, 13, 24, 28

#7 ***Solution:*** There exist real numbers a and b such that $\sqrt{a+b} = \sqrt{a} + \sqrt{b}$.

$$a = 16 \text{ and } b = 0$$
$$\sqrt{16+0} = \sqrt{16} + \sqrt{0}$$
$$4 = 4$$

#13 ***Solution:*** For every integer n, if n is odd, then $\frac{n-1}{2}$ is odd.

Negation: There exists an integer n such that n is odd and $\dfrac{n-1}{2}$ is even.
Counterexample: $n = 1$
$\dfrac{1-1}{2} = 0$ which is even.
Conclusion: The statement is false.

#24 ***Solution:*** For every real number x, if $x > 1$, then $x^2 > x$.

Quantification Implicit If x is a real number and $x > 1$, then $x^2 > x$.
First sentence of proof: "Suppose x is a real number greater than 1."
Last sentence of proof: "$x^2 > x$"

#28 ***Solution:***

a. $\forall$ integers m and n, if m and n are odd, then $m + n$ is even,
as $\forall$ odd integers m and n, $m + n$ is even,
and as If m and n are any odd integers, then $m + n$ is even.

b. By **definition of odd,** $m = 2r + 1$ and $n = 2s + 1$ for some integers r and s.
Then
$m + n = (2r + 1) + (2s + 1)$ by **substitution**
$= 2r + 2s + 2$
$= 2(r + s + 1)$ by algebra
Let $u = r + s + 1$. Then u is an integer because r, s, and 1 are integers and because **definition of**

4.2

Exercises

Abeyah Calpatura
#2, 5, 17, 20

#2 ***Solution:*** question

$$answer$$

#5 ***Solution:*** question

$$answer$$

#17 ***Solution:*** question

$$answer$$

#20 ***Solution:*** question

$$answer$$