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**

1

4.2

Exercises

Abeyah Calpatura
#2, 5, 17, 20

> **#2** *Solution:* For every integer m, if m is even then $3m + 5$ is odd.

> > *answer*

> **#5** *Solution:* question

> > *answer*

> **#17** *Solution:* question

> > *answer*

> **#20** *Solution:* question

> > *answer*