

Algebra I
Winter 2020



WAYNE STATE
UNIVERSITY

CHAPTER 1 INTEGERS

1.1 Divisors

1. Let $m, n, r, s \in \mathbb{Z}$. If $m^2 + n^2 = r^2 + s^2 = mr + ns$, prove that $m = r$ and $n = s$.

Joe Starr

We select $m, n, r, s \in \mathbb{Z}$, given $m^2 + n^2 = r^2 + s^2 = mr + ns$ which can write as

$m^2 + n^2 - mr - ns = r^2 + s^2 - mr - ns$. From here we can simplify:

$$m^2 + n^2 - mr - ns = r^2 + s^2 - mr - ns \Rightarrow m(m - r) + n(n - s) = r(r - m) + s(s - n)$$

$$\Rightarrow m(m - r) + n(n - s) - r(r - m) - s(s - n) = 0$$

$$\Rightarrow m(m - r) + r(m - r) + n(n - s) + s(n - s) = 0$$

$$\Rightarrow (m - r)(m + r) + (n - s)(n + s) = 0$$

from here we can see that in order for $(m - r)(m + r) + (n - s)(n + s) = 0$ to be true

$m = r$ and $n = s$.

5. Use the Euclidean algorithm to find the following greatest common divisors

a (6643, 2873)

b (7684, 4148)

c (26460, 12600)

d (6540, 1206)

e (12091, 8439)

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a (6643, 2873)

$$6643 = 2873 * 2 + 897$$

$$2873 = 897 * 3 + 182$$

$$897 = 182 * 4 + 169$$

$$182 = 169 * 1 + 13$$

$$169 = 13 * 13$$

7. For each part of Exercise 5, find integers m and n such that (a, b) is expressed in the form $ma + nb$.

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a (6643, 2873)

b (7684, 4148)

c (26460, 12600)

d (6540, 1206)

e (12091, 8439)

CHAPTER 2 SECTION

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2.1 A Subsection

CHAPTER 3 SECTION

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3.1 A Subsection

CHAPTER 4 SECTION

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CHAPTER 9 SECTION

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9.1 A Subsection

CHAPTER 10 SECTION

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10.1 A Subsection