Chapter 7.1, Problem 11E

Problem

Define *F:* **Z × Z** → **Z × Z** as follows: For all ordered pairs (*a, b*) of integers, *F*(*a, b*) = (*2a + 1,* 3b − 2).

Find the following:

a. *F*(4, 4)

b. *F*(2, 1)

c. *F*(3, 2)

d. *F*(1,5)

Step-by-step solution

Step 1 of 5

Consider a function $f:\mathbb{Z}\times\mathbb{Z}\to\mathbb{Z}\times\mathbb{Z}.$

For all ordered pairs of integers $(a,b),$ the function defined as:

$$F(a,b)=(2a+1,3b-2).$$

Step 2 of 5

(a)

The objective is to find the function value at $(a,b)=(4,4).$

$$\begin{aligned}F(4,4)&=(2\cdot4+1,\ 3\cdot4-2)\\&=(8+1,12-2)\\&=(9,10)\end{aligned}$$

Hence, the function value at $(a,b)=(4,4)$ is $F(4,4)=\boxed{(9,10)}.$

Step 3 of 5

(b)

The objective is to find the function value at $(a,b)=(2,1).$

$$\begin{aligned}F(2,1)&=(2\cdot2+1,\ 3\cdot1-2)\\&=(4+1,3-2)\\&=(5,1)\end{aligned}$$

Hence, the function value at $(a,b)=(2,1)$ is $F(2,1)=\boxed{(5,1)}.$

Step 4 of 5

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(c)

The objective is to find the function value at $(a,b)=(3,2)$.

$$F(3,2)=(2\cdot 3+1,\ 3\cdot 2-2)$$
$$=(6+1,6-2)$$
$$=(7,\ 4)$$

Hence, the function value at $(a,b)=(3,2)$ is $F(3,2)=\boxed{(7,\ 4)}$.

Step 5 of 5

(d)

The objective is to find the function value at $(a,b)=(1,5)$.

$$F(1,5)=(2\cdot 1+1,\ 3\cdot 5-2)$$
$$=(2+1,15-2)$$
$$=(3,\ 13)$$

Hence, the function value at $(a,b)=(1,5)$ is $F(1,5)=\boxed{(3,\ 13)}$.

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