Matrix arithmetic revision

6 questions | 23 marks

Equivalent correct methods earn the corresponding marks.

1. For rows A: $(2,-1),(3,4)$, and B: $(1,5),(-2,0)$, find $2A-B$. [3 marks]

Double A to $(4,-2),(6,8)$.

Subtract corresponding entries.

Answer: Rows $(3,-7),(8,8)$.

2. For rows A: $(1,2,0),(-1,3,2)$, and column $b=(4,1,2)$, find Ab. [3 marks]

First row: $1(4)+2(1)+0(2)=6$.

Second row: $-1(4)+3(1)+2(2)=3$.

Answer: Column $(6,3)$.

3. Let A have rows $(1,1),(0,1)$ and B have rows $(2,0),(1,3)$. [6 marks]

(a) Find AB. [3 marks]

Row 1: $1(2)+1(1)=3$ and $1(0)+1(3)=3$.

Row 2: $0(2)+1(1)=1$ and $0(0)+1(3)=3$.

Thus AB has rows $(3,3),(1,3)$.

Answer: Rows $(3,3),(1,3)$.

(b) Find BA and compare. [3 marks]

Row 1: $2(1)+0(0)=2$ and $2(1)+0(1)=2$.

Row 2: $1(1)+3(0)=1$ and $1(1)+3(1)=4$.

Thus BA has rows $(2,2),(1,4)$, which differs from AB.

Answer: Rows $(2,2),(1,4)$; the products differ.

4. A 4×3 matrix multiplies a 3×2 matrix. State the result order. Is the reverse product defined? [3 marks]

Inner dimensions match in the first product.

For the reverse product, 2 and 4 do not match.

Answer: 4×2; the reverse product is not defined.

5. Equal matrices have rows $(x+2, 5), (4, y-1)$ and $(9, 5), (4, 6)$. Find x, y. [3 marks]

Matching entries give $x + 2 = 9$ and $y - 1 = 6$.

Answer: $x = 7, y = 7$.

6. A bakery sells muffins at AUD 3 and rolls at AUD 2. Branch X sells (12,20); Y sells (8,30). [5 marks]

(a) State the sales-matrix and price-column orders. [2 marks]

Rows represent branches and columns products.

Answer: 2×2 and 2×1.

(b) Find and interpret the income column. [3 marks]

Calculate $12(3) + 20(2) = 76$ and $8(3) + 30(2) = 84$.

Answer: (76,84): X earns AUD 76 and Y earns AUD 84.