Ex.30

(a) $R_1 \cup R_2$: $\{(1,1),(1,2),(2,1),(2,2),(2,3),(3,1),(3,2),(3,3),(3,4)\}$

(b) $R_1 \cap R_2$: $\{(1,2),(2,3),(3,4)\}$

(c) $R_1 - R_2$: $\emptyset$

(d) $R_2 - R_1$: $\{(1,1),(2,1),(2,2),(3,1),(3,2),(3,3)\}$

Ex.32.

$S \circ R$: $\{(1,1),(1,2),(2,1),(2,2)\}$

Section 9.2

Ex.12.

Part_number	project	quantity	Color_code
911	2	80	4

Ex.16

Airline	Flight_number	Destination
Nadir	122	Detroit
⋮	⋮	⋮

Ex.19

Supplier	Part_number	project	Quantity	Color_code
23	1092	1	2	2
23	1101	3	1	1
⋮	⋮	⋮	⋮	⋮

Section 9.3

Ex.14.

(a) $R_1 \cup R_2$: $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ (b) $R_1 \cap R_2$: $\begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{bmatrix}$ (c) $R_2 \circ R_1$: $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

(d) $R_1 \circ R_1$: $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ (e) $R_1 \oplus R_2$: $\begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

Ex.32

26: reflexive, not symmetric, not antisymmetric, not ~~transive~~ transitive

27: not reflexive, symmetric, not antisymmetric, not transitive

28. reflexive, symmetric, not antisymmetric, not transitive