1.

$$\left(W - \Pi_{a,b} \left(\sigma_{\substack{a=a_1 \\ \text{and} \\ b<>b_1}}^{(W \times W_1)} \right) \right)$$

$$\cup$$

$$\Pi_a \left[\sigma_{\substack{a=a_1 \\ \text{and } b<>b_1}}^{(W \times W_1)} \right]$$

S = Student   C = Cites
B = Buys   M = Major
BK = Books.

(a)

$$\left(\pi_{\substack{S.Sid \\ S.Sname}} (S \bowtie_{S.Sid = B.Sid} B) \bowtie_{C.BookNo = B.BookNo} \pi_{BookNo.} (C) \right)$$

(b) $M_1 = \rho_{m_1} (Sid_1, m_1) (M)$
      $M_2 = \rho_{m_2} (Sid_2, m_2) (M)$

$$\pi_{\substack{Sid \\ Sname.}} \left(S \bowtie_{S.Sid = m_1.Sid} \pi_{m_1.Sid} \left(\sigma_{\substack{m_1.Sid = m_2.Sid \\ and \\ m_1.major \neq m_2.major}} (M_1 \times M_2) \right) \right)$$

(c)

$$\pi_{Sid}\left(S \bowtie B \xrightarrow[S \cdot Sid = B \cdot Sid]{} \pi_{Sid}\left(S \bowtie_{S \cdot Sid = B \cdot Sid} \pi_{B \cdot Sid}\left(\sigma_{\substack{B \cdot Sid = B_1 \cdot Sid \\ \text{and} \\ B \cdot BookNo \ne B_1 \cdot BookNo}}(B \times B_1)\right)\right)\right)$$

d

$$\pi_{BK \cdot Buyns}\left[BK - \pi_{\substack{BK_1 \cdot bookno \\ BK_1 \cdot title \\ BK_1 \cdot Price}}\left((BK_1) \bowtie \sigma_{BK_1 \cdot Price > BK_2 \cdot Price}(BK_2)\right)\right]$$

(c)

$$\pi_{Bk.BookNo}\left[Bk = \pi_{Bk.BookNo}\left(Bk \bowtie_{\sigma_{B.H.Price>750} \, C.BookNo = Bk.BookNo} C\right)\right]$$

(f)

$$\left(\pi_{Sid}(B) = \pi_{B.Sid}\left(B \bowtie_{B.BookNo = Bk.BookNo} \pi_{BookNo}\left(Bk_{\sigma_{Bk.Price \geq 30}}\right)\right)\right)$$

(9)

$$\left[\pi_{b.sid}\left(\sigma_{m.major = 's'}\begin{array}{c} B \bowtie M \\ \downarrow \\ b.sid = m.sid \end{array} \right) \quad X \quad \pi_{B\cap.Booking}(BK) \right.$$

$$-$$

$$\left. \pi_{\substack{b.sid \\ b.bukng}}\left(\sigma_{m.major = 's'}\begin{array}{c} B \bowtie M \\ \downarrow \\ B.sid = m.sid \end{array} \right) \right]$$