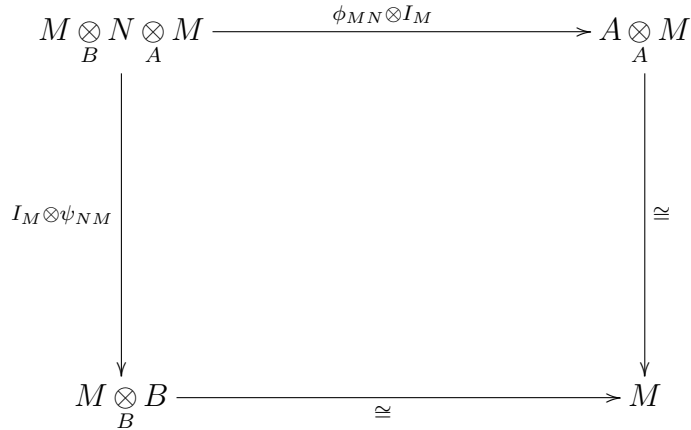


By Ali Reza Khoddami and applying the usepackages  
 $\usepackage{all}{xy}, \usepackage{xypic}, \usepackage{CD}$

```

\[\xymatrix @C=5cm @R=5cm{
M\mathop{\otimes}\limits_{B}N\mathop{\otimes}\limits_{A}M \\
\var{r}^{\{\phi_{MN}\otimes I_M\}} \\
\var{d}_{\{I_M\otimes\psi_{NM}\}} \\
& A\mathop{\otimes}\limits_{A}M \var{d}^{\cong} \\
M\mathop{\otimes}\limits_{B}B\var{r}_{\cong} & M \\
}\]

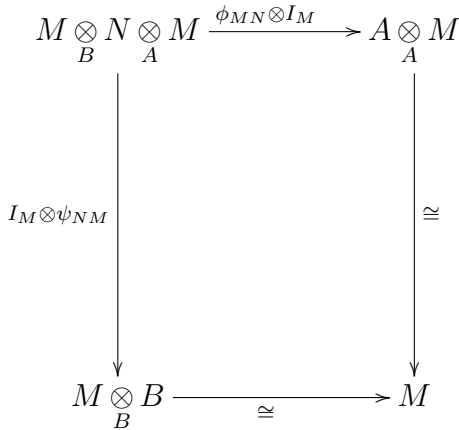
```



```

\[\xymatrix @C=3cm @R=4cm{
M\mathop{\otimes}\limits_{B}N\mathop{\otimes}\limits_{A}M \\
\var{r}^{\{\phi_{MN}\otimes I_M\}} \\
\var{d}_{\{I_M\otimes\psi_{NM}\}} \\
& A\mathop{\otimes}\limits_{A}M \var{d}^{\cong} \\
M\mathop{\otimes}\limits_{B}B\var{r}_{\cong} & M \\
}\]

```



```

\[\xymatrix @C=4cm @R=2cm{
N\mathop{\otimes}\limits_{B}M\mathop{\otimes}\limits_{A}N \\
\var{r}^{\{\psi_{MN}\otimes I_N\}} \\
\var{d}_{\{I_N\otimes\phi_{MN}\}} \\
& B\mathop{\otimes}\limits_{B}N \var{d}^{\cong} \\
N\mathop{\otimes}\limits_{A}A\var{r}_{\cong} & N \\
}\]

```

$$\begin{array}{ccc}
N \otimes_B M \otimes_A N & \xrightarrow{\psi_{MN} \otimes I_N} & B \otimes_B N \\
\downarrow I_N \otimes \phi_{MN} & & \downarrow \cong \\
N \otimes_A A & \xrightarrow{\cong} & N
\end{array}$$

$\backslash [ \backslash xymatrix @C=3cm @R=4cm {$   
 $G^* \backslash ar[r]^{\pi_G^*} \& (G \hat{\otimes} G)^*$   
 $A^* \backslash ar[r]_{\pi_A^*} \backslash ar[u]^{\{q_1\}} \& (A \hat{\otimes} A)^* \backslash ar[u]_{\{q_2\}}$   
 $\backslash ]$

$$\begin{array}{ccc}
G^* & \xrightarrow{\pi_G^*} & (G \hat{\otimes} G)^* \\
\uparrow q_1 & & \uparrow q_2 \\
A^* & \xrightarrow{\pi_A^*} & (A \hat{\otimes} A)^*
\end{array}$$

$\backslash [ \backslash xymatrix @C=2cm @R=4cm {$   
 $G^* \backslash ar[r]^{\pi_G^*} \& (G \hat{\otimes} G)^*$   
 $A^* \backslash ar[r]_{\pi_A^*} \backslash ar[u]^{\{q_1\}} \& (A \hat{\otimes} A)^* \backslash ar[u]_{\{q_2\}}$   
 $\frac{A}{\langle MN \rangle} \backslash ar[r]_{\pi_{\frac{A}{\langle MN \rangle}}^*} \& (\frac{A}{\langle MN \rangle} \hat{\otimes} \frac{A}{\langle MN \rangle})^* \backslash ar[u]^{\{q_3\}} \&$   
 $(\frac{A}{\langle MN \rangle} \hat{\otimes} \frac{A}{\langle MN \rangle})^* \backslash ar[u]_{\{q_4\}}$   
 $\backslash ]$

$$\begin{array}{ccc}
G^* & \xrightarrow{\pi_G^*} & (G \hat{\otimes} G)^* \\
\uparrow q_1 & & \uparrow q_2 \\
A^* & \xrightarrow{\pi_A^*} & (A \hat{\otimes} A)^* \\
\uparrow q_3 & & \uparrow q_4 \\
\frac{A}{\langle MN \rangle}^* & \xrightarrow{\pi_{\frac{A}{\langle MN \rangle}}^*} & (\frac{A}{\langle MN \rangle} \hat{\otimes} \frac{A}{\langle MN \rangle})^*
\end{array}$$

```

\begin{CD}
A @>\phi>> B @>>\varphi> C \\
@V\psi VV @AA\pi A @V\alpha VV \\
D @>\beta>> E @<\Gamma<< F \\
@VVV @AAA @VVV \\
G @>\zeta>> H @<<\varepsilon<< K
\end{CD}

```

$$\begin{array}{ccccc}
 A & \xrightarrow{\phi} & B & \xrightarrow{\varphi} & C \\
 \psi \downarrow & & \uparrow \pi & & \alpha \downarrow \\
 D & \xrightarrow{\beta} & E & \xleftarrow{\Gamma} & F \\
 \downarrow & & \uparrow & & \downarrow \\
 G & \xrightarrow{\zeta} & H & \xleftarrow{\varepsilon} & K
 \end{array}$$

```

\matrix[C=8cm]{A \otimes H_1 \times B \otimes H_2 \ar[r]^{-\{\varphi\}} & E \times H_4}

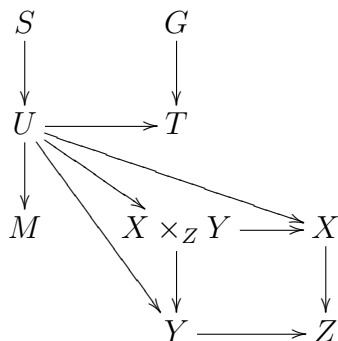
```

$$A \otimes H_1 \times B \otimes H_2 \xrightarrow{\varphi} E \times H_4$$

```

\matrix{S \ar[d] & G \ar[d] \\
U \ar[ddr] \ar[dr] \ar[r] \ar[d] & T \\
M & X \times_Z Y \ar[r] & X \\
& \downarrow & \downarrow \\
& Y \ar[r] & Z}

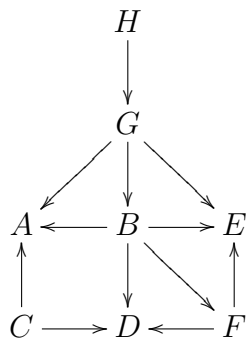
```



```

\matrix{& H \ar[d] & \\
& G \ar[dl] \ar[d] \ar[dr] & \\
A & B \ar[r] \ar[d] \ar[dr] \ar[l] & E \\
C \ar[u] \ar[r] & D & F \ar[l] \ar[u]}

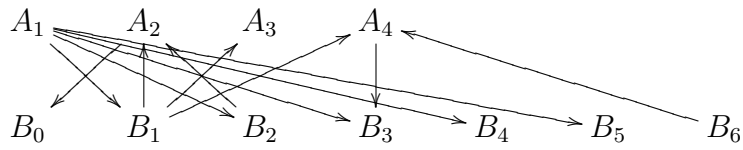
```



```

\[\xymatrix { A_1 \ar[dr] \ar[dr] \ar[dr] \ar[dr] \ar[dr] & A_2 \ar[d] \\
& A_3 & A_4 \\
& B_0 & B_1 \ar[u] \ar[ur] \ar[urr] & B_2 \ar[ul] & B_3 & B_4 & B_5 & B_6 \\
& & & & & & & } \]

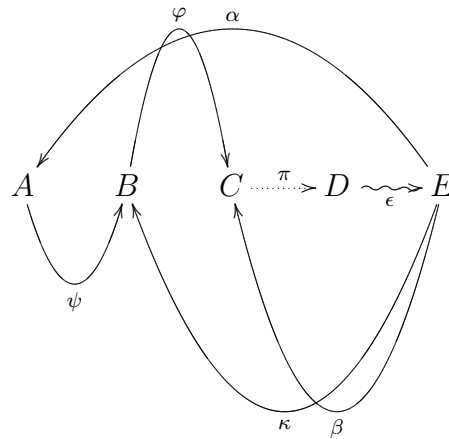
```



```

\[\xymatrix { A \ar@/_{3pc}/[r]_{\psi} & B \ar@/^{5pc}/[r]^{\varphi} \\
& C \ar@{.}>[r]^{\pi} & D \ar@{~}>[r]_{\epsilon} & E \\
& & & & & & & } \]

```



**Be successful**  
**Ali Reza khoddami**