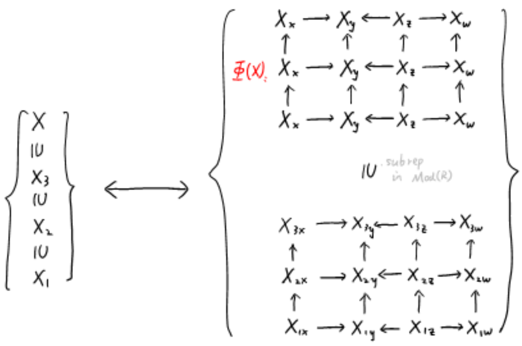
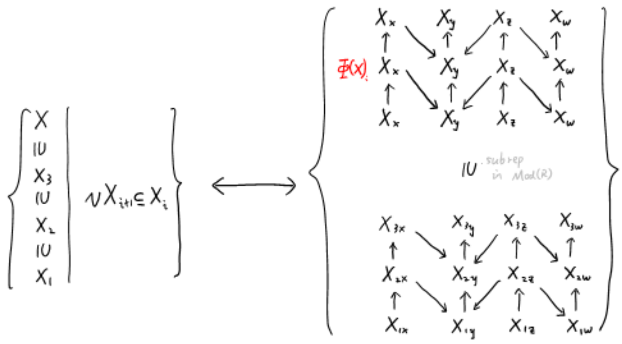
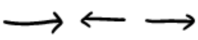


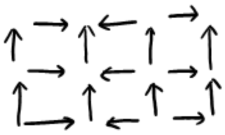
$\mathcal{F}lag_3(X) \longleftrightarrow Gr(\Phi(X))$



$\mathcal{F}lag_{3,str}(X) \longleftrightarrow Gr(\Phi(X))$



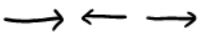
Q



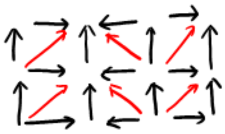
Q_3

$Q_{3,str}$

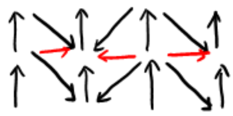
$R = KQ_d /_{\uparrow \rightrightarrows \uparrow}$ or $KQ_{d,str}/_{\uparrow\searrow\searrow\uparrow}$ $d \geq 2$



Q



Q_3



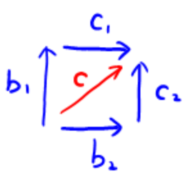
$Q_{3,str}$

$\rightarrow$ is the virtual arrow

$$\begin{tikzcd}
\eta \in Ext^1(\Phi(S),\Phi(X)) \arrow[d] \arrow[dd, mapsto, bend right] & 0 \arrow[r] & \Phi(X) \arrow[r] \arrow[d, equal] & \Phi(Y) \arrow[r, "\pi"] & \Phi(S) \arrow[r] & 0 \\
Ext^1(W,\Phi(X)) \arrow[d] & 0 \arrow[r] & \Phi(X) \arrow[r] \arrow[d] & \pi^{-1}(W) \arrow[r] \arrow[u] \arrow[d] & W \arrow[r] \arrow[u] \arrow[d, equal] & 0 \\
\bar{\eta} \in Ext^1(W, \Phi(X)/V) & 0 \arrow[r] & \Phi(X)/V \arrow[r] & \pi^{-1}(W)/V \arrow[r] & W \arrow[r] & 0
\end{tikzcd}$$

$$0 \longrightarrow \bigoplus_{c\in Q_2} Re_{t(c)} \otimes_k e_{s(c)}T \longrightarrow \bigoplus_{b\in Q_1} Re_{t(b)} \otimes_k e_{s(b)}T \longrightarrow \bigoplus_{i\in Q_0} Re_i \otimes_k e_i T \longrightarrow \cancel{T} \longrightarrow 0$$

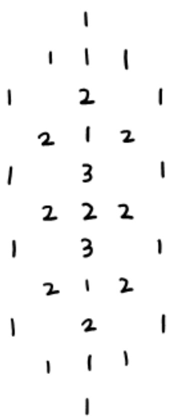
$= c_1 b_1$
$= c_2 b_2$



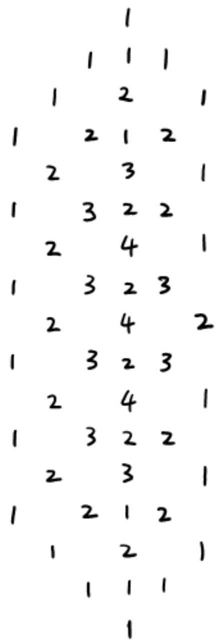
$r \otimes x \longmapsto rc_1 \otimes x + r \otimes b_1 x - rc_1 \otimes x - r \otimes b_2 x$

$r \otimes x \longmapsto rx$

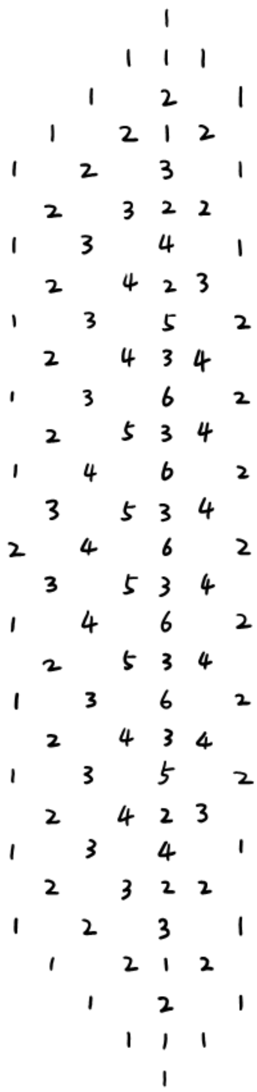
$r \otimes x \longmapsto rb \otimes x - r \otimes bx$



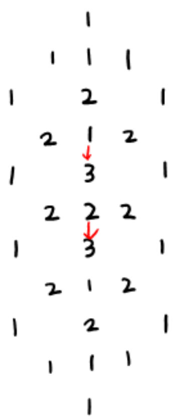
E_6



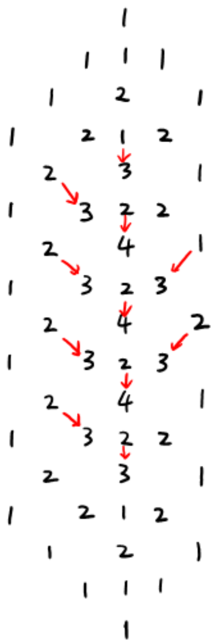
E_7



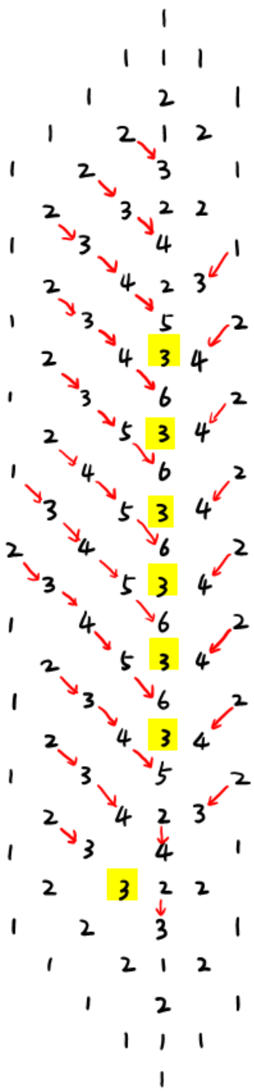
E_8



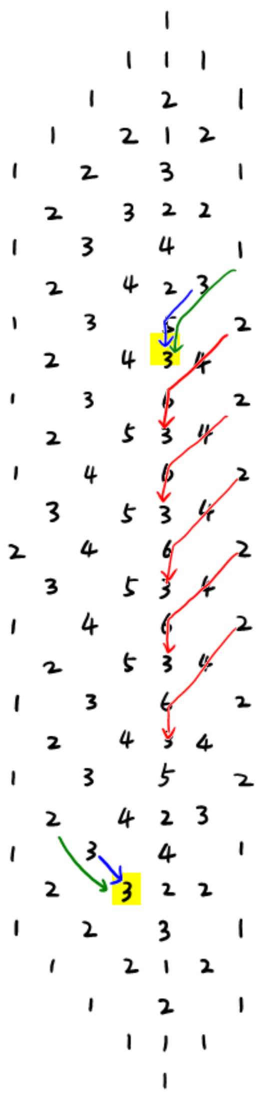
E_6



E_7



E_8, easy situation

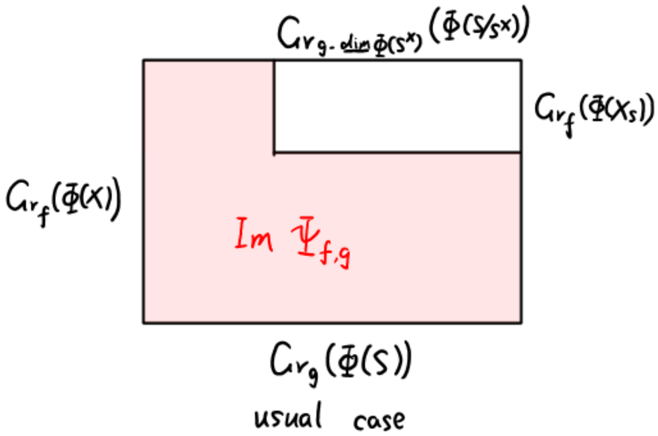


E_8, some exceptions

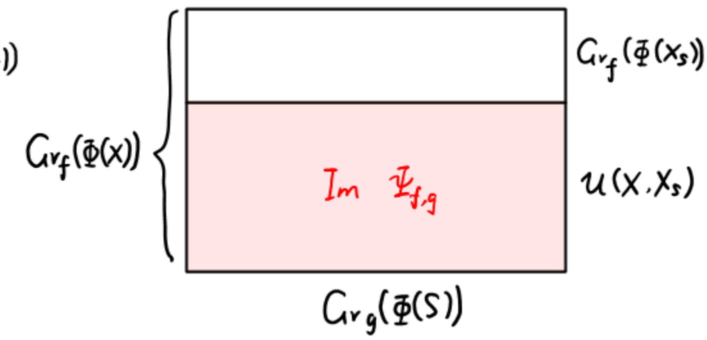
blue & green are two different possibilities.

$[M,N]$ / $[M,N]'$ (M \ N)	X	Y	S
X	1 / 0	1 / 0	0 / 0
Y	0 / 0	1 / 0	1 / 0
S	0 / 1	0 / 0	1 / 0

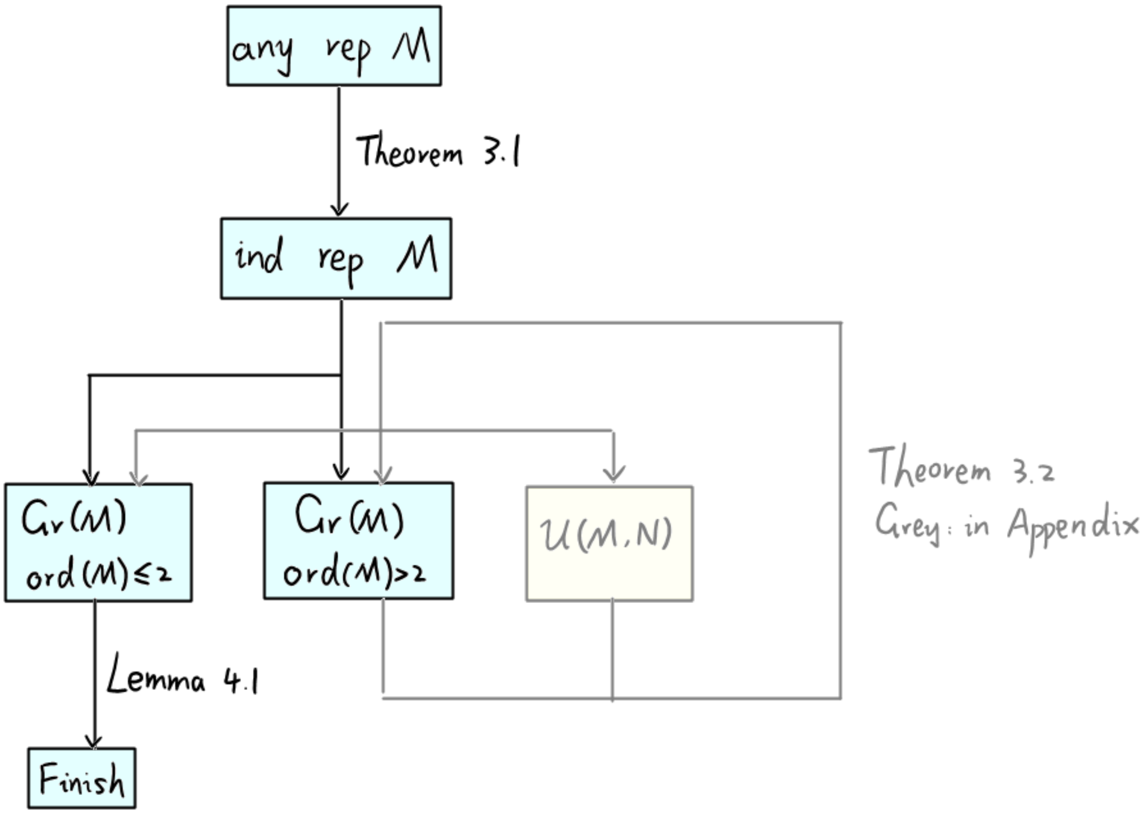
$$
\begin{tikzcd}
\eta \in \mathrm{Ext}^1(\Phi(S),\Phi(X)) \arrow[d] \\
\mathrm{Ext}^1(W,\Phi(X)) \arrow[d] \\
\bar{\eta} \in \mathrm{Ext}^1(W,\Phi(X)/V)
\end{tikzcd}
\qquad
\begin{tikzcd}
0 \arrow[r] & \Phi(X) \arrow[r] & \Phi(Y) \arrow[r, "\pi"] & \Phi(S) \arrow[r] & 0 \\
0 \arrow[r] & \Phi(X) \arrow[r] \arrow[u, equal] \arrow[d] & \pi^{-1}(W) \arrow[r] \arrow[u] \arrow[d] & W \arrow[r] \arrow[u] \arrow[d, equal] & 0 \\
0 \arrow[r] & \Phi(X)/V \arrow[r, "\iota"] & \pi^{-1}(W)/V \arrow[r, "\pi'"] & W \arrow[r] \arrow[l, bend left, "\theta"] & 0
\end{tikzcd}
$$

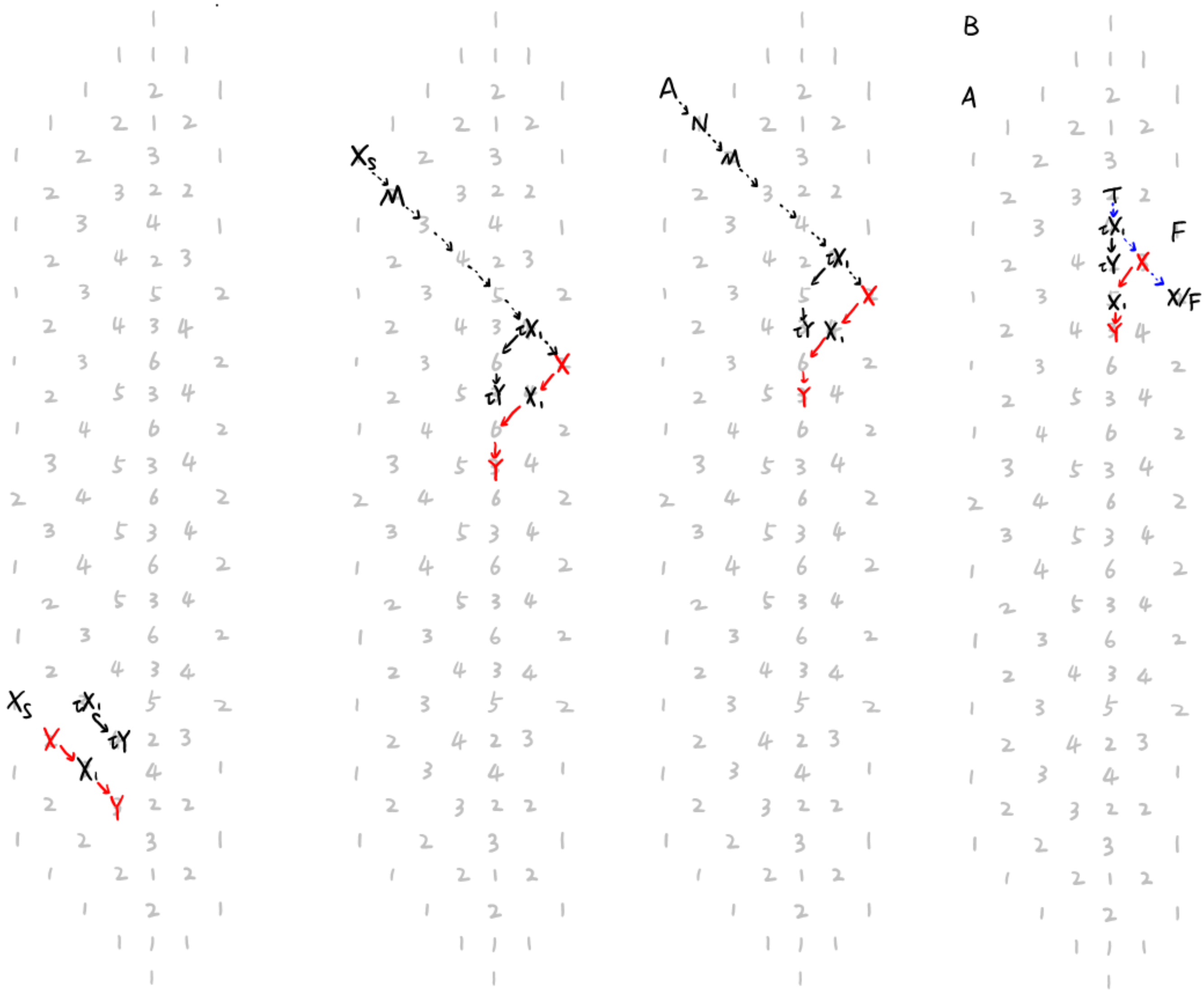


usual case



minimal section mono case


any rep M
Theorem 3.1
ind rep M
Gr(M)
ord(M)≤2
Gr(M)
ord(M)>2
U(M,N)
Theorem 3.2
Grey: in Appendix
Lemma 4.1
Finish



(a) (b) (c) (d)