(A) 2-cycle (Liar paradox)
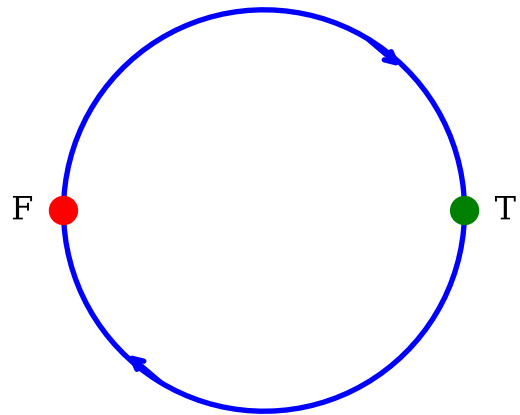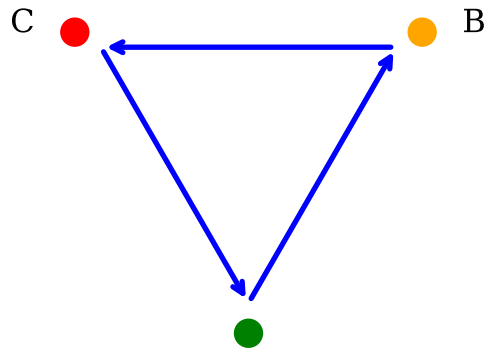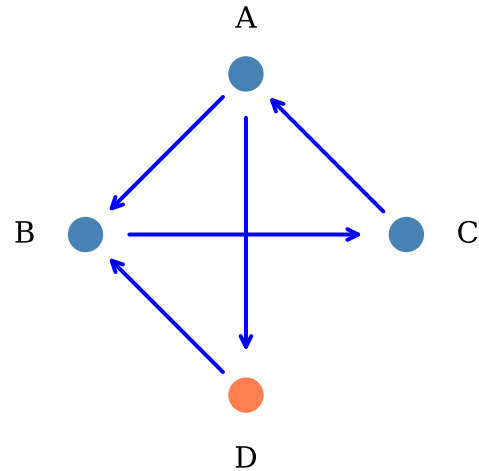
F   T

$k_{min} = 3$

(B) 3-cycle

C   B

A

$k_{min} = 3$

(C) Nested cycles

A

B   C

D

$k_{min} \geq 3$