Additional Diagram Problems

Sentences:

1. $\forall x(T(x) \rightarrow \exists y(M(y) \wedge A(x,y)))$
2. $\exists x(M(x) \wedge \forall y(T(y) \rightarrow A(y,x)))$
3. $\forall x(T(x) \rightarrow \exists y(M(y) \wedge \neg A(x,y)))$
4. $\exists x(T(x) \wedge \forall y(M(y) \rightarrow \neg A(x,y)))$
5. $\forall x(M(x) \rightarrow \exists y(T(y) \wedge A(y,x)))$
6. $\exists x(M(x) \wedge \forall y(T(y) \rightarrow \neg A(y,x)))$
7. $\forall x(M(x) \rightarrow \exists y(T(y) \wedge \neg A(y,x)))$
8. $\exists x(T(x) \wedge \forall y(M(y) \rightarrow A(x,y)))$
9. $\forall x \forall y((T(x) \wedge T(y) \wedge x \neq y) \rightarrow \exists z(M(z) \wedge A(x,z) \wedge A(y,z)))$
10. $\exists x \exists y(M(x) \wedge M(y) \wedge \forall z(T(z) \rightarrow (A(x,z) \vee A(z,y))))$
11. $\forall x \forall y((T(x) \wedge T(y) \wedge x \neq y) \rightarrow \exists z(M(z) \wedge \neg A(x,z) \wedge \neg A(y,z)))$
12. $\exists x \exists y(T(x) \wedge T(y) \wedge \forall z(M(z) \rightarrow (A(x,z) \vee A(y,z))))$
13. $\exists x \exists y(M(x) \wedge M(y) \wedge \forall z(T(z) \rightarrow (\neg A(z,x) \vee \neg A(z,y))))$
14. $\forall x(M(x) \rightarrow \neg \exists y \exists z(T(y) \wedge T(z) \wedge y \neq z \wedge A(y,x) \wedge A(z,x)))$

Diagrams:

Diagram 1

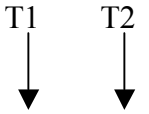


Diagram 2

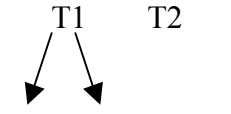


Diagram 3

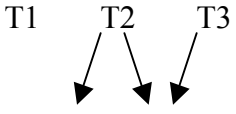


Diagram 4

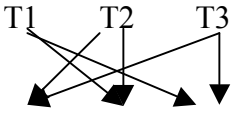


Diagram 5

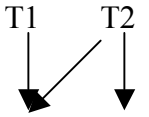


Diagram 6

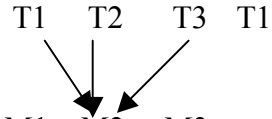


Diagram 7

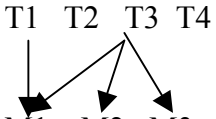
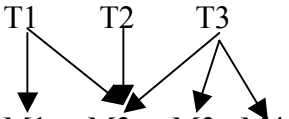


Diagram 8



ANSWERS ON NEXT PAGE

Answers:

Sentences:	Answers for D1	D2	D3	D4	D5	D6	D7	D8
1. $\forall x(T(x) \rightarrow \exists y(M(y) \wedge A(x,y))$	T	F	F	T	T	T	F	T
- Every teacher attended at least one meeting.								
2. $\exists x(M(x) \wedge \forall y(T(y) \rightarrow A(y,x)))$	F	F	F	F	T	T	F	T
- There is a meeting that every teacher attended.								
3. $\forall x(T(x) \rightarrow \exists y(M(y) \wedge \neg A(x,y)))$	T	T	F	T	F	T	F	T
- For every teacher there is a meeting they did not attend.								
4. $\exists x(T(x) \wedge \forall y(M(y) \rightarrow \neg A(x,y)))$	F	T	T	F	F	F	T	F
- There is a teacher who attended no meetings. (opposite of 1)								
5. $\forall x(M(x) \rightarrow \exists y(T(y) \wedge A(y,x)))$	T	F	T	T	T	F	T	T
- For every meeting there is a teacher attended.								
6. $\exists x(M(x) \wedge \forall y(T(y) \rightarrow \neg A(y,x)))$	F	T	F	F	F	T	F	F
- There is a meeting that no teacher attended. (opposite of 5)								
7. $\forall x(M(x) \rightarrow \exists y(T(y) \wedge \neg A(y,x)))$	T	T	T	T	F	F	T	F
- For every meeting there is a teacher who did not attend. (opposite of 2)								
8. $\exists x(T(x) \wedge \forall y(M(y) \rightarrow A(x,y)))$	F	F	T	F	T	F	T	F
- There is a teacher who attended every meeting. (opposite of 3)								
9. $\forall x\forall y((T(x) \wedge T(y) \wedge x \neq y) \rightarrow \exists z(M(z) \wedge A(x,z) \wedge A(y,z)))$	F	F	F	T	T	T	F	T
- For every pair of teachers there is a meeting they both attended.								
10. $\exists x\exists y(M(x) \wedge M(y) \wedge \forall z(T(z) \rightarrow (A(x,z) \vee A(z,y))))$	T	F	F	T	T	T	F	T
- There is a pair of meetings such that every teacher went to one or the other.								
11. $\forall x\forall y((T(x) \wedge T(y) \wedge x \neq y) \rightarrow \exists z(M(z) \wedge \neg A(x,z) \wedge \neg A(y,z)))$	F	T	F	F	F	T	F	F
- For every pair of teachers there is a meeting that neither attended.								
12. $\exists x\exists y(T(x) \wedge T(y) \wedge \forall z(M(z) \rightarrow (A(x,z) \vee A(y,z))))$	T	F	T	T	T	F	T	T
- There is a pair of teachers such that for every meeting either the first teacher attended or the second teacher attended.								
13. $\exists x\exists y(M(x) \wedge M(y) \wedge \forall z(T(z) \rightarrow (\neg A(z,x) \vee \neg A(z,y))))$	T	T	F	F	F	T	F	T
- There is a pair of meetings such that every teacher either did not attend the first meeting or did not attend the second meeting.								
14. $\forall x(M(x) \rightarrow \neg\exists y\exists z(T(y) \wedge T(z) \wedge y \neq z \wedge A(y,x) \wedge A(z,x)))$	T	T	F	F	F	F	F	F
- No meeting had two different teachers attending.								