

(Here's a test on Unit 2 from a previous semester. Your test will be formatted differently, as I'll explain in class. But the questions will be similar. Scroll down to see the answers.)

Exam 2

Part I. Symbolize the following statements. (3 points each; 24 total)

1. If the fossil I have found is a primate, then it has five fingers.
2. The fossil I have found is a primate, if it has five fingers.
3. Primates have five digits and humans have five digits.
4. This fossilized primate is an ancestor either of humans or of modern chimpanzees, but if this fossilized primate walked upright, then it is an ancestor of humans.
5. If you are not getting along with your spouse then, if you are not an effective communicator, you should seek a marriage counselor.
6. Apes and humans are both descended from Lucy, a fossilized primate from 3M BCE.
7. Both humans and apes can use sign language.
8. Humans and apes are related if and only if they share a common ancestor.

Part II. Draw a truth table for each of the following statements. Is the statement a tautology, a contradiction or a contingent statement? (5 points each; 15 total)

9. $(G \supset \sim Q) \equiv \sim (Q \bullet G)$
10. $(N \supset K) \supset (K \supset N)$
11. $(\sim A \vee B) \bullet \sim (A \supset B)$

Part III. Are the following pairs of statements logically equivalent, or not? (5 points each; 15 total)

12. $A \bullet \sim B; \sim (A \supset B)$
13. $\sim (A \vee B); \sim A \vee \sim B$
14. $\sim (A \bullet B); \sim A \bullet \sim B$

Part IV. Draw a truth table for each argument below. Is the argument valid, or invalid? (6 points each; 18 points total)

15.
 1. $B \vee M$
 2. $\sim M$
 3. Therefore, B
16.
 1. $P \supset Q$
 2. $\sim Q$
 3. Therefore, P
17.
 1. $B \vee M$
 2. $B \vee \sim K$
 3. Therefore, $(K \vee \sim M) \supset B$

Part IV. Complete the following proofs, citing the rule and lines that justify each conclusion you draw. (8 points each; 40 total)

18.
 1. $(A \supset B) \bullet (B \supset C)$
 2. A / Prove C
19.
 1. $(A \supset B) \bullet ((E \bullet D) \supset C)$
 2. $A \vee (E \bullet D)$
 3. $\sim A$ /Prove C

20.

1. $A \supset B$
2. $C \supset (D \vee E)$
3. $A \vee C$
4. $\sim B$ /Prove $(D \vee E)$

21.

1. $A \supset B$
2. $C \supset (D \vee E)$
3. $A \vee C$
4. $\sim A$ /Prove $(D \vee E)$

22.

1. A
2. $(A \vee C) \supset B$
3. $B \supset (D \supset X)$
4. $\sim X$ /Prove $\sim D$

Exam 2 Answers

Part I. Symbolize the following statements. (3 points each; 24 total)

1. If the fossil I have found is a primate, then it has five fingers.
a. $P \supset F$
2. The fossil I have found is a primate, if it has five fingers.
a. $F \supset P$
3. Primates have five digits and humans have five digits.
a. $H \cdot D$
4. This fossilized primate is an ancestor either of humans or of modern chimpanzees, but if this fossilized primate walked upright, then it is an ancestor of humans.
a. $(U \vee C) \cdot (W \supset U)$
5. If you are not getting along with your spouse then, if you are not an effective communicator, you should seek a marriage counselor.
a. $\sim G \supset (\sim E \supset M)$
6. Apes and humans are both descended from Lucy, a fossilized primate from 3M BCE.
a. $A \cdot L$
7. Both humans and apes can use sign language. $S \cdot M$
8. Humans and apes are related if and only if they share a common ancestor. $R \equiv C$

Part II. Draw a truth table for each of the following statements. Is the statement a tautology, a contradiction or a contingent statement? (5 points each; 15 total)

9. $(G \supset \sim Q) \equiv \sim (Q \bullet G)$

10. $(N \supset K) \supset (K \supset N)$

(N	\supset	(K)	\supset	(K	\supset	N)
T	T	T	T	T	T	T
F	T	T	F	T	F	F
T	F	F	T	F	T	T
F	T	F	T	F	T	F

Contingent

11. $(\sim A \vee B) \bullet \sim (A \supset B)$

Self contradictory

Part III. Are the following pairs of statements logically equivalent, or not? (5 points each; 15 total)

12. $A \bullet \sim B; \sim (A \supset B)$

yes

13. $\sim (A \vee B); \sim A \vee \sim B$

no

14. $\sim (A \bullet B); \sim A \bullet \sim B$

No

Part IV. Draw a truth table for each argument below. Is the argument valid, or invalid? (6 points each; 18 points total)

15.

1. $B \vee M$
2. $\sim M$
3. Therefore, B

valid

16.

1. $P \supset Q$
2. $\sim Q$
3. Therefore, P

Not valid

17.

1. $B \vee M$
2. $B \vee \sim K$
3. Therefore, $(K \vee \sim M) \supset B$

Valid

Part IV. Complete the following proofs, citing the rule and lines that justify each conclusion you draw. (8 points each; 40 total)

18. Given

1. $(A \supset B) \bullet (B \supset C)$
2. A Prove C
3. $A \supset B$ a, Simp
4. $(B \supset C) \bullet (A \supset B)$ a, Com
5. $B \supset C$ d, Simp
6. $A \supset C$ c, e HS
7. C b, f, MP

19. Given

1. $(A \supset B) \bullet ((E \bullet D) \supset C)$
2. $A \vee (E \bullet D)$
3. $\sim A$ Prove C
4. $E \bullet D$ b, c, DS
5. $((E \bullet D) \supset C) \bullet (A \supset B)$ a, Com
6. $(E \bullet D) \supset C$ e, Simp
7. C f, d, MP

20. Given

1. $A \supset B$
2. $C \supset (D \vee E)$
3. $A \vee C$
4. $\sim B$ Prove $(D \vee E)$
5. $\sim A$ a, d, MT
6. C c, e, DS
7. $D \vee E$ f, c, MP

21. Given

1. $A \supset B$
2. $C \supset (D \vee E)$
3. $A \vee C$
4. $\sim A$ Prove $(D \vee E)$
5. C d, c, DS
6. $D \vee E$ b, e, MP

22. Given

1. A
2. $(A \vee C) \supset B$
3. $B \supset (D \supset X)$
4. $\sim X$ Prove $\sim D$
5. $(B \bullet D) \supset X$ c, exp
6. $A \vee C$ a, add
7. B
8. $D \supset X$
9. $\sim D$