(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)

1. (G ⊃ ~ Q) ≡ ~ (Q • G)
2. (N ⊃ K) ⊃ (K ⊃ N)
3. (~A ∨ B) • ~ (A ⊃ B)

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

1. A • ~ B; ~ (A ⊃ B)
2. ~ ( A ∨ B); ~ A ∨ ~ B
3. ~ (A • B); ~A • ~ B

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

* 1. B ∨ M
  2. ~ M
  3. Therefore, B

1. 1. P ⊃ Q
   2. ~ Q
   3. Therefore, P
2. 1. B ∨ M
   2. B ∨ ~ K
   3. Therefore, (K ∨ ~ M) ⊃ B

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

* 1. (A ⊃ B) • (B ⊃ C)
  2. A / Prove C
  3. (A ⊃ B) • ((E • D) ⊃ C)
  4. A ∨ (E • D)
  5. ~ A /Prove C
  6. A ⊃ B
  7. C ⊃ (D ∨ E)
  8. A ∨ C
  9. ~ B /Prove (D ∨ E)
  10. A ⊃ B
  11. C ⊃ (D ∨ E)
  12. A ∨ C
  13. ~ A /Prove (D ∨ E)
  14. A
  15. (A ∨ C) ⊃ B
  16. B ⊃ (D ⊃ X)
  17. ~ X /Prove ~ B

**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.
   1. P ⊃ F
2. The fossil I have found is a primate, if it has five fingers.
   1. F ⊃ P
3. Primates have five digits and humans have five digits.
   1. H . 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.
   1. (U v C) . (W ⊃ 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.
   1. ~G ⊃ (~ E ⊃ M)
6. Apes and humans are both descended from Lucy, a fossilized primate from 3M BCE.
   1. A . L
7. Both humans and apes can use sign language. S . M
8. Humans and apes are related if and only if they share a common ancestor. R ≡ 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)

1. (G ⊃ ~ Q) ≡ ~ (Q • G)
2. (N ⊃ K) ⊃ (K ⊃ N)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| (N | ⊃ | K) | ⊃ | (K | ⊃ | 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

1. (~A ∨ B) • ~ (A ⊃ B)

**Self contradictory**

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

1. A • ~ B; ~ (A ⊃ B)

yes

1. ~ ( A ∨ B); ~ A ∨ ~ B

no

1. ~ (A • B); ~A • ~ B

Not valid

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

* 1. B ∨ M
  2. ~ M
  3. Therefore, B

valid

2. P ⊃ Q
3. ~ Q
4. Therefore, P

Not valid

2. B ∨ M
3. B ∨ ~ K
4. Therefore, (K ∨ ~ M) ⊃ B

Valid

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

1. Given
2. (A ⊃ B) • (B ⊃ C)
3. A Prove C
4. A ⊃ B a, Simp
5. (B ⊃ C) • (A ⊃ B) a, Com
6. B ⊃ C d, Simp
7. A ⊃ C c, e HS
8. C b, f, MP
9. Given
10. (A ⊃ B) • ((E • D) ⊃ C)
11. A ∨ (E • D)
12. ~ A Prove C
13. E • D b,c, DS
14. ((E • D) ⊃ C) • (A ⊃ B) a, Com
15. (E • D) ⊃ C e, Simp
16. C f, d, MP
17. Given
18. A ⊃ B
19. C ⊃ (D ∨ E)
20. A ∨ C
21. ~ B Prove (D ∨ E)
22. ~ A a, d, MT
23. C c, e, DS
24. D ∨ E f, c, MP
25. Given
26. A ⊃ B
27. C ⊃ (D ∨ E)
28. A ∨ C
29. ~ A Prove (D ∨ E)
30. C d, c, DS
31. D ∨ E b, e, MP
32. Given
33. A
34. (A ∨ C) ⊃ B
35. B ⊃ (D ⊃ X)
36. ~ X Prove ~~~ B~~ (this was supposed to be ~ D)
37. (B • D) ⊃ X c, exp
38. A ∨ C a, add
39. B
40. D ⊃ X
41. ~ D