**Math 231 – HW 1 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Epp 2nd Ed. 1.1 5abcd, 7, 8, 13, 15, 18, 20, 39, 40, 42

(5) *Indicate which of the following sentences are statements. If it's not a statement, say why.*

(a) 1024 is the smallest 4-digit number that is a perfect square.

(b) She is a math major.

(c) 

(d) 

*For problems 7 and 8, write the statement in symbolic form using the symbols , , and  and the indicated letter to represent component statements:*

(7) Juan is a math major but not a computer science major.

(m = "Juan is a math major", c = "Juan is a computer science major")

(8) h = "John is healthy", w = "John is wealthy", s = "John is wise"

(a) John is healthy and wealthy but not wise.

(b) John is not wealthy but he is healthy and wise.

(c) John is neither healthy, wealthy, nor wise.

*Write truth tables for the statement forms in problems 13 and 15:*

(13) 

|  |  |  |
| --- | --- | --- |
|  |  |  |
| T | T |  |
| T | F |  |
| F | T |  |
| F | F |  |

(15) 

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | r |  |
| T | T | T |  |
| T | T | F |  |
| T | F | T |  |
| T | F | F |  |
| F | T | T |  |
| F | T | F |  |
| F | F | T |  |
| F | F | F |  |

*Determine which of the pairs of statement forms in 18 and 20 are logically equivalent. Justify your answers using truth tables. Read t to be a tautology and c to be a contradiction.*

(18) 

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| T | T |  |  | T | T |  |
| T | F |  |  | T | F |  |
| F | T |  |  | F | T |  |
| F | F |  |  | F | F |  |

(20) 

|  |  |  |
| --- | --- | --- |
|  |  |  |
| T | F |  |
| F | F |  |

*Use truth tables to establish which of the statements forms in problems 39 and 40 are tautologies and which are contradictions:*

(39) 

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | r |  |
| T | T | T |  |
| T | T | F |  |
| T | F | T |  |
| T | F | F |  |
| F | T | T |  |
| F | T | F |  |
| F | F | T |  |
| F | F | F |  |

(40) 

|  |  |  |
| --- | --- | --- |
|  |  |  |
| T | T |  |
| T | F |  |
| F | T |  |
| F | F |  |

*In problem 42, a logical equivalence is derived from Theorem 1.1.1. Supply a reason for each step:*

(42)

