1.)a)

--SQL query:

SELECT LastName, FirstName, SID

FROM Student

WHERE city = 'Chicago' AND started < 2002;

--Resulting Table:

|  |  |  |
| --- | --- | --- |
| LASTNAME | FIRSTNAME | SID |
| Patel | Prakash | 75234 |

b)

--SQL query:

SELECT LastName, FirstName, SID

FROM Student

WHERE program <> 'COMP-SCI' AND program <> 'COMP-GPH';

--Resulting Table:

|  |  |  |
| --- | --- | --- |
| LASTNAME | FIRSTNAME | SID |
| Snowdon | Jonathan | 8871 |
| Winter | Abigail | 11035 |
| Starck | Jason | 19992 |

c)

--SQL query:

SELECT LastName, FirstName, SID

FROM Student

WHERE (program = 'COMP-SCI' OR program = 'INFO-SYS') AND city <> 'Chicago';

--Resulting table:

|  |  |  |
| --- | --- | --- |
| LASTNAME | FIRSTNAME | SID |
| Snowdon | Jonathan | 8871 |
| Patel | Deepa | 14662 |
| Starck | Jason | 19992 |
| Snowdon | Jennifer | 93321 |

2) a) ¬q ^ p ^ r

b) ¬p ^ ¬q ^ ¬r

c) p ^ ¬q ˇ ¬r

3) a) p → ¬p

|  |  |  |
| --- | --- | --- |
| **p** | **¬p** | **p → ¬p** |
| T | F | F |
| F | T | T |

b) (p ^ q) → (p ˇ q)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **p** | **q** | **p ^ q** | **p ˇ q** | **(p ^ q) → (p ˇ q)** |
| T | T | T | T | T |
| T | F | F | T | T |
| F | T | F | T | T |
| F | F | F | F | T |

c) (p ^ q) ˇ (¬r)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **p** | **q** | **r** | **¬r** | **p ^ q** | **(p ^ q) ˇ (¬r)** |
| T | T | T | F | T | T |
| T | T | F | T | T | T |
| T | F | T | F | F | F |
| T | F | F | T | F | T |
| F | F | T | F | F | F |
| F | T | F | T | F | T |
| F | T | T | F | F | F |
| F | F | F | T | F | T |

4)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **p** | **q** | **p → q** | **(p → q) → p** | **((p → q) → p) → p** |
| T | T | T | T | T |
| T | F | F | T | T |
| F | T | T | F | T |
| F | F | T | F | T |

5)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **p** | **q** | **r** | **f(p,q,r)** |  |
| T | T | T | F |  |
| T | T | F | T | *(p ^ ¬q ^ r)ˇ* |
| T | F | T | T | *(p ^ q ^ ¬r)ˇ* |
| T | F | F | F |  |
| F | F | T | F |  |
| F | T | F | F |  |
| F | T | T | T | *( ¬p ^ q ^ r)* |
| F | F | F | F |  |

**(p ^ ¬q ^ r)ˇ (p ^ q ^ ¬r)ˇ ( ¬p ^ q ^ r)**

6) “Exactly one of these statements is true.” Is the only statement that can be true assuming that one of the bullet points is true. It is true because it is the only one that can be true. In any other bullet point the statements truth would make it not true. The other statements require more than one statement to be true, but because the statements require an exact amount of statements to be true they must be false.