**PreCalc BC Groups Name:**

1. Determine whether each of the following forms a group under the indicated operation. If not, clearly show which property is violated. If it is a group, describe the identity and inverses, and determine whether the group is commutative (“abelian”).

a) ({1, 0}, + ) b) ({-1, 0, 1}, x ) c) (***W***, + )

d) ({non-zero real numbers}, ÷ ) e) (***N*** , \* ) where *x \* y = (1 + x) + y*

f) (***Z***6, ) g) (***Z***6, ) h) (***Z***6\*, ) i) (***Z***7\*, )

j) ({1, -1, *I, -I* }, x) k) 

l) m) n)

|  |  |  |
| --- | --- | --- |
| **∆** | **a** | **b** |
| **a** | a | b |
| **b** | b | b |

|  |  |  |  |
| --- | --- | --- | --- |
| **°** | **p** | **q** | **r** |
| **p** | p | q | r |
| **q** | q | q | p |
| **r** | r | p | r |

|  |  |  |
| --- | --- | --- |
| **\*** | **0** | **1** |
| **0** | 1 | 0 |
| **1** | 0 | 1 |

o) ({even integers}, + ) p) ({odd integers}, x ) q) ({......}, x )

2. Determine which of the following is a sub-group. Identify the “mother” group for each, as well as the identity and inverses.

a) ({multiples of 3}, + ) b) ({1, 6}, 7) c) ({1, 3}, 7) d) ({1,2, 4}, 7)

3. Identify all possible subgroups for each of the following:

a) (***Z***6, ) b) (***Z***8, ) c) (***Z***5, ) d) (***Z***5\*, )