1.

$$-9-4-2$$
$$B = -2511-5$$
$$-520$$

$$4128$$
$$A = -7-6-8$$
$$4-32$$

$$-9-4-2$$
$$B^2 = -2511-5$$
$$-520$$

$$-36-48-48$$
$$A^2 = -18-24-24$$
$$456060$$

$$-9-4-2$$
$$B^3 = -2511-5$$
$$-520$$

$$000$$
$$A^3 = 000$$
$$000$$

$$-9-4-2$$
$$B^4 = -2511-5$$
$$-520$$

$jedeweiterePotenz > 3 = A^3,$
$daMultiplikationmit0immer0!$

$$-9-4-2$$
$$B^5 = -2511-5$$
$$-520$$

$$Offentsichtlichentstehtbeider Multiplikation$$
$$vonBmitBkeineneueMatrizemehr, dahergiltB^x = B$$

2.

$$EsgiltA * B = (C_{ij}) mitC_{ij} = 0 f\text{ü}ri \neq jundC_{ii} = \sum_{k=1}^{n} a_{ik}b_{ki} = a_{ii} * b_{ii}$$

$$wegenKommutativit\text{ä}tgiltdaherauchb_{ii} * a_{ii} = \sum_{k=1}^{n} b_{ik}a_{ki} = C_{ii}und$$

$$daC_{ij} = 0 f\text{ü}ri \neq jfolgt(C_{ij}) = B * A.$$

$$DarausfolgtB * A = A * Bf\text{ür}Diagonalmatrizen$$

3.

a.) b.) c.)

$$12-10$$
$$A = 26-3-3$$
$$310-5-6$$

$$13$$
$$B = 0-2$$
$$5-1$$
$$-23$$

$$23-4-7-3$$
$$C = 381-7-8$$
$$143-1-4$$
$$131-2-3$$

$$12-10$$
$$02-1-3$$
$$04-2-6$$

$$13$$
$$0-2$$
$$0-16$$
$$09$$

$$23-4-7-3$$
$$08147-7$$
$$05105-5$$
$$0363-3$$

$$12-10$$
$$02-1-3$$
$$0000$$

$$13$$
$$0-2$$
$$00$$
$$00$$

$$23-4-7-3$$
$$08147-7$$
$$00000$$
$$00000$$

$$\Rightarrow rg(A) = 2 \Rightarrow rg(B) = 2 \Rightarrow rg(C) = 2$$