(16) a) True
b) False
c) True
d) True
e) True
f) True
g) False
h) False

(17) $x > \frac{11}{2}$

(18) Yes it's possible. The remaining eigenspace could be 1-dimensional. But the union of the bases of the eigenspaces must have 7 vectors in order for the matrix to be diagonalizable.

(11) Find a diagonal matrix that A is similar to. D_1
" " " that B is similar to D_2.
If $D_1 = D_2$ then $A \sim B$.

(20) a) $\lambda = 3, -1 \Leftrightarrow k = 3$.
b) $\lambda = 1$ with mult 2 $\Leftrightarrow k = -1$.
c) A has no real eigenvalues $\Leftrightarrow k < -1$.

(21) Addition is not associative
There is no zero or additive inverse
$1 \cdot x \neq x$.
$c_1(c_2 x) \neq (c_1 c_2)x$.
distributivity doesn't hold.

(22) $W_1 = \left\{ \begin{bmatrix} 0 \\ b \\ 0 \end{bmatrix} \right\}$ $W_2 = \left\{ \begin{bmatrix} a \\ 0 \\ c \end{bmatrix} \right\}$

$W_1 \cup W_2 = \left\{ v \in \mathbb{R}^3 : v = \begin{bmatrix} 0 \\ b \end{bmatrix} \text{ or } v = \begin{bmatrix} a \\ 0 \\ c \end{bmatrix} \right\}$

but the sum of these two vectors is not in $W_1 \cup W_2$, so
$W_1 \cup W_2$ is not a subspace of $\mathbb{R}3$.