11

(a) Variables: all capital letters that can be ~~removed~~ counted.

$$V = \{R, X, S, T\}$$

Terminals: Small Caps letters i.e $\Sigma = \{a, b\}$

Start variable: If not otherwise stated, start variable is the first one that appears i.e. variable ~~is the first one~~ t' on the left side of first rule of grammar. So, start variable of grammar, G is R.

(b) Trying some derivatives of different strings in language L(G) of grammar G.

Three of them are: ab, ba, aab

(c) ε, a. and b are the three strings not belonging to L(G)

(d) We can fairly easily see that from T we
can derive any string is $\{0,1\}^*$. Further,
from s we can get any string which
begins with a and ends with b and
vice-versa. Since, from R we can again get
any number of X, on both sides, finally
we can get any string which contains
a and b. i.e. $L(G) = \{a,b\}^* \setminus \{a^* \cup b^*\}$

(e) $T \Rightarrow^* T$ True as $\Rightarrow^*$ includes the
identity relation.

(f) $X \Rightarrow^* aba$ False. as there is no such
production