**a)**

● ¬𝑝 ∧ 𝑞 ∨ 𝑝

The negation of a logical expression can be found by applying De Morgan's laws, which state that the negation of a conjunction is the disjunction of the negations, and the negation of a disjunction is the conjunction of the negations.

Applying this to the expression ¬𝑝 ∧ 𝑞 ∨ 𝑝, we first negate each term:

1. ¬(¬𝑝) = 𝑝
2. ¬(𝑞) = ¬𝑞

Next, we negate the conjunction to obtain the disjunction of the negations:

(𝑝) ∨ (¬𝑞)

So the negation of ¬𝑝 ∧ 𝑞 ∨ 𝑝 is 𝑝 ∨ ¬𝑞.

● ∀𝑥(𝑃(𝑥) → 𝑄(𝑥))

To find the negation of the statement ∀𝑥(𝑃(𝑥) → 𝑄(𝑥)), we first apply the negation operator to the conditional "→". The negation of a conditional statement "p → q" is "p ∧ ¬q".

So, the negation of ∀𝑥(𝑃(𝑥) → 𝑄(𝑥)) is:

∃𝑥(𝑃(𝑥) ∧ ¬𝑄(𝑥))

This says that there exists some x for which both P(x) is true and Q(x) is false. In other words, the negation of the original statement says that it is not the case that for all x, P(x) implies Q(x).

**b)**

A password has 5 characters, and each character can either be a digit or a lowercase letter. There are 10 digits (0 to 9) and 26 lowercase letters, so there are a total of 36 possible characters.

To have more letters than digits, we can have either 5 letters and 0 digit,4 letters and 1 digits, or 3 letters and 2 digits. We'll consider these cases separately:

1. **5 letters and 1 digit**: 5 letters .
2. **3 letters and 2 digits**: There are 26 options for each of the first 3 letters, and 10 options for each of the last 2 digits. So there are a total of 26 x 26 x 26 x 10 x 10 = 458,752 possible passwords in this case.
3. **4 letters and 3 digits**: There are 26 options for each of the first 4 letters, and 10 options for each of the last 3 digits. So there are a total of 26 x 26 x 26 x 26 x 10 x 10 x 10 = 6,634,560 possible passwords in this case.

Adding up all three cases, we get a total of 6,760 + 458,752 + 6,634,560 = 6,700,072 possible passwords.