PAC Learning

1. H_1 is consistent with a set of training examples (D) if an only if $H_1(x) = C(x)$ for training examples $(x, c(x))$ in D. It is given that, H_1 is identical to the set of all possible target concepts C, hence H_1 is consistent.

2. Given 20 parameters, $|H_1| = 2^{2^{20}}$

3. The number of training examples required to learn would be given by:

$$m \geq \frac{1}{\epsilon}\left(ln|H| + ln(\frac{1}{\delta})\right)$$

   Given:$\epsilon = 0.01, 1 - \delta = 0.95$
   $m \geq 72,682,050$

4. No, the given Hypothesis H_2 is not consistent as this is not identical to C for all the training examples as in H_2 (x_a, x_b) map to X whereas in C which is identical to H_1, X as a vector maps to Y.

5. Given that there are 20 x_a and x_b, $|H_2| = (n * (n-1)/2) * 16 = 3,040$

6. The minimum number of training examples can be calculated as above:
   $m \geq 1,102$

7. Hypothesis H_2 has a higher bias since it has a lower number of features as compared to $|H_2|$.