Pop Quiz Aug. 1, 2006

1) Answer: c 3.93
Solution: get pKa: pKa = -logKa = -log(2.8×10^{-4})=3.553
pH= pKa+log(base/acid)=3.553+log(22.5/(32-22.5) = 3.93

More explanation:
The ratio: base/acid =? It takes 32.0 mL of base to react all the weak acid. So, if 32.0 mLs represents the total moles of weak acid, then 22.5 mLs of would represent the moles of reacted weak acid, in other words, the moles of base. And the remaining acid would be 32.0 - 22.5 = 9.5 mLs.

2) Answer: b, 8.17

Solution: First get M_{HA}: $M_{HA} = M_1V_1/V_e = (.100)(32.0)/(20.0) = 0.160M$;

At equiv pt: $[A^-] = [HA]_o(20/(20+32)) = .160\ (.385) = .0615M$

at equiv: use K_b equil: $A^- + H_2O <-> HA + OH$, $K_b = 10^{-14}/2.8 \times 10^{-4} = 3.571 \times 10^{-11}$

so $x^2/.0615 \approx 3.571 \times 10^{-11} => x = 1.48 \times 10^{-6} = [OH] => pOH = 5.829$; pH = 8.17