ASTR368
HW #1

1) a) If in fact, $A_V = 0$

$m_V - M_V = 5 \log d - 5$

$m_V = 5 \log d - 5 + M_V = 5 \log(700) - 5 - 1.1$

$= 8.1$

b) $m_V = 5 \log d - 5 + M_V + A_V = 5 \log(720) - 5 - 1.1 + 1.1$

$= 9.3$

c) $m_V - M_V = 5 \log d - 5$

$d = 10^{(m_V - M_V + 5)/5} = 10^{(9.3 + 1.1 + 5)/5} = 1200 \text{ pc}$

d) $\frac{A_V}{A_B} = \frac{\lambda_B}{\lambda_V} = \frac{440}{550} = 0.8$

So $A_B = \frac{A_V}{0.8} = \frac{1.1}{0.8} = 1.375$

e) From Appendix G, B5 $B-V = -0.17$

$\frac{F_V}{F_B} = 10^{0.4(m_B - m_V)} = 10^{0.4(-0.17)} = 0.85$

2) $\tau = 0.5$

$\Delta V = 10\ km/s$

$\tau_H = 5.2 \times 10^{-23} N_H T^{-1} \Delta V$

Assume $T \sim 100K$,

$$N_H = \frac{\tau T}{5.2 \times 10^{-23} \Delta V} = \frac{0.5 \times 100}{5.2 \times 10^{-23} \cdot 10} = 9.6 \times 10^{22}\ m^{-2}$$

$N \equiv \int n\,ds$ if $n = \bar{n}$, $N = n s$ where

s is the path length

So $s = \frac{N}{n}$ and if we assume

$n = 10^2\ cm^{-3} = 10^8\ m^{-3}$, $s \sim 10^{15} m \sim 0.03 pc$