In order to make red look like yellow ($\lambda = 575\,\text{nm}$) 

Express in terms of $c$ 

This is relativistic Doppler effect on light waves (Secs. 37.6). So use eq. 37.25, p. 1424, since this is a shift to shorter wavelength (blue shift): 

\[ f = \frac{1}{\sqrt{1 - \frac{u^2}{c^2}}} \, f_0 \]

Solve for $u$ 

Square both sides: 

\[ f^2 = \frac{(c+u)}{(c-u)} \cdot f_0^2 \]

Rearrange: 

\[ (c-u) f^2 = (c+u) f_0^2 \]

and 

\[ cn^2 - uf^2 = c f_0^2 + uf_0^2 \]

\[ c f^2 - c f_0^2 = u f_0^2 + uf^2 = u \left( f_0^2 + f^2 \right) \]

\[ u = c \left( \frac{f^2 - f_0^2}{f_0^2 + f^2} \right) \]

from $\frac{\lambda f}{c} = \lambda_0$ 

Subst. $f = \frac{c}{\lambda_0} f_0 = \frac{c}{\lambda_0}$ 

\[ u = c \left[ \left( \frac{2c}{\lambda_0} \right)^2 - 1 \right] \cdot \frac{\lambda_0^2}{(\frac{2c}{\lambda_0})^2 + 1} = c \left[ \left( \frac{2c}{\lambda_0} \right)^2 - 1 \right] \]

Rearranged to relative wavelength shift format: 

Subst. in $\lambda$ to $\lambda_0$ values * (you'll get formula shown in Ex. 37.9, p. 1425) 

\[ u = 0.159 \, c = 0.159 \, (3 \times 10^8 \, \text{m/s}) = 4.77 \times 10^7 \, \text{m/s} \]

\[ U = 4.77 \times 10^4 \, \text{km/s} \]

\[ U \times 0.62 \, \text{mi/km} \]

\[ = 2.96 \times 10^4 \, \text{mi/s} \]

\[ 3600 \, \text{sec/1 hr} \]

\[ 1.12 \times 10^3 \, \text{km/hr} \]

\[ \frac{1.12 \times 10^3 \, \text{km/hr}}{1 \, \text{hr}} \]

\[ 1.066 \times 10^8 \, \text{mi/hr} \]
b. What is your fine for speeding? Fine rate is $1 per each km/hr over 90 km/hr.

\[
\text{Fine} = (U - 90 \text{ km/hr}) \times \frac{$1}{(\text{km/hr})}
\]

\[
= (1.72 \times 10^8 \text{ km/hr} - 90 \text{ km/hr}) \times \frac{$1}{(\text{km/hr})}
\]

\[
= $1.72 \times 10^8 = $172 \times 10^6
\]

\[
= 172 \text{ million dollars}
\]