76. (a) We note that $d = (76 \times 10^6\,\text{nm})/40000 = 1900\,\text{nm}$. For the first order maxima $\lambda = d\sin\theta$, which leads to

$$\theta = \sin^{-1}\left(\frac{\lambda}{d}\right) = \sin^{-1}\left(\frac{589\,\text{nm}}{1900\,\text{nm}}\right) = 18^\circ\ .$$

Now, substituting $m = d\sin\theta/\lambda$ into Eq. 37-27 leads to $D = \tan\theta/\lambda = \tan 18^\circ/589\,\text{nm} = 5.5 \times 10^{-4}\,\text{rad/nm} = 0.032^\circ/\text{nm}$. Similarly for $m = 2$ and $m = 3$, we have $\theta = 38^\circ$ and 68°, and the corresponding values of dispersion are $0.076^\circ/\text{nm}$ and $0.24^\circ/\text{nm}$, respectively.

(b) $R = Nm = 40000\,m = 40000$ (for $m = 1$); 80000 (for $m = 2$); and, $120,000$ (for $m = 3$).