78. (a) If the destroyer drifts with the current, then it will detect a signal with frequency f' given by

$$\begin{aligned} f' &= f\left(\frac{v}{v-u_1}\right) \\ &= \frac{(1000\,\text{Hz})(5470\,\text{km/h})}{5470\,\text{km/h}-(75.0\,\text{km/h}-30.0\,\text{km/h})} \\ &= 1008.29\ \text{Hz}\ . \end{aligned}$$

Thus, $\Delta f = f' - f = 8.29\,\text{Hz}$.

(b) If the destroyer is stationary with respect to the ocean floor, then it is moving at $u_2 = 30.0\,\text{km/h}$ relative to the current. The detected frequency then becomes

$$\begin{aligned} f'' &= f\left(\frac{v+u_2}{v-u_1}\right) = \frac{(1000\,\text{Hz})(5470\,\text{km/h}+30.0\,\text{km/h})}{5470\,\text{km/h}-(75.0\,\text{km/h}-30.0\,\text{km/h})} \\ &= 1013.9\ \text{Hz}\ . \end{aligned}$$

Thus, $\Delta f = f'' - f = 13.9\,\text{Hz}$.