

**PHY 2811 (2009)**

***Solution of Exp.3 prelab questions***

(1) (HRK 5/e, Prob. 19-19)

(a)  $u=5470$  km/h,

$$v_0 = -94.6 \text{ km/h}$$

$$f = 1030 \text{ Hz}$$

$$v_s = 20.2 \text{ km/h}$$

$$\rightarrow f' = f \frac{u - v_0}{u - v_s} = 1.05 \text{ kHz (note: three significant figures)}$$

(b)  $v_0 = -20.2$  km/h

$$v_s = +94.6 \text{ km/h}$$

$$f' = 1.05 \text{ kHz}$$

$$\rightarrow f'' = f' \frac{u - v_0}{u - v_s} = 1.07 \text{ kHz}$$

$$(2) f' = f \left( \frac{u}{u - v_s} \right) = f \left( 1 - \frac{v_s}{u} \right)^{-1} \approx f \left( 1 + \frac{v_s}{u} \right)$$

$$f'' = f \left( \frac{u}{u + v_s} \right) = f \left( 1 + \frac{v_s}{u} \right)^{-1} \approx f \left( 1 - \frac{v_s}{u} \right)$$