1-1. Once airborne, the plane's motion is relative to still air. In 10 min the air mass has moved $18\,m/s \times 60\,s/\text{min} \times 10\,\text{min} = 10.8\ km$ toward the east. The north and up coordinates relative to the ground (and perpendicular to the wind direction) are unaffected. The 25 km point has moved 10.8 km east and is, after 10 min, at $25 - 10.8 = 14.2\ km$ west of where the plane left the ground (0, 0, 0) after 10 min the plane is at (14.2 km, 16 km, 0.5 km).

1-2. (a) $t = \dfrac{2L}{c} = \dfrac{2(2.74\times 10^4\ m)}{3.00\times 10^8\ m/s} = 1.83\times 10^{-4}\ s$

(b) From Equation 1-7 the correction $\delta t \approx \dfrac{2L}{c}\times\dfrac{v^2}{c^2}$

$$\delta t = (1.83\times 10^{-4} s)(10^{-4})^2 = 1.83\times 10^{-12}\ s$$

(c) From experimental measurements $\dfrac{\delta c}{c} = \dfrac{4\ km/s}{299{,}796\ km/s} = 1.3\times 10^{-5}$

No, the relativistic correction of order 10^{-8} is three orders of magnitude smaller than the experimental uncertainty.

1-3. $\dfrac{0.4\text{ fringe}}{(29.8\,km/s)^2} = \dfrac{1.0\text{ fringe}}{(v\ km/s)^2} \rightarrow v^2 = \dfrac{1.0}{0.4}(29.8\,km/s)^2 = 2.22\times 10^3 \rightarrow v = 47.1\ km/s$