Question 2:

Assuming a cloverleaf interchange has a radius of curvature of 80 meters at the tightest part of the turn, what is the fastest a car could travel around this curve without experiencing more than 1/2 a g in acceleration? Assume the car is traveling at a constant speed. If the car was instead increasing speed at a rate of 2 m/s^2, what would be the new overall magnitude of the acceleration experienced by the passengers?

1) constant speed

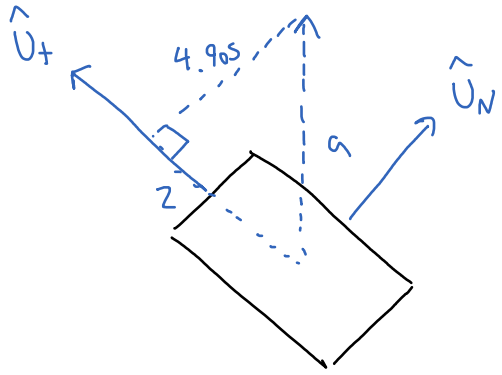
$a_t = 0$ $\quad a_n = 4.905 \frac{m}{s^2} = \frac{v^2}{\rho}$

ρ: 80m

$v = \sqrt{(4.905 \frac{m}{s^2})(80m)} = \boxed{19.8 \text{ m/s} \approx 44.3 \text{ mph}}$

2)

$a_t = 2\ m/s^2$ $\qquad$ $a_n = 4.905\ m/s^2$



$$a = \sqrt{(2)^2 + (4.905)^2}$$

$$\boxed{a = 5.297\ m/s^2}$$