total: 24 points

Homework 3.3

(2) **E.26** Your body can only sense acceleration (and feels it like an fictitious force, due to your body's inertia). The higher the acceleration, the larger sensation of the fictitious force. Our body is not able to sense velocity, so we don't feel the high speed cruising of the airplane.

(2) **E.27** While you can feel accelerations, you can't feel velocity. (Basically the same as E. 26)

(2) **E.29** When the rattle accelerates, the beads inside it continueon and hit the walls of the rattle. The rattle then makes noise.

(2) **E. 30** Due to its inertia. The car wants to go in a straight line along the tangent of the curve. Thus, during a sharp left-hand turn, it will roll up the right hand wall.

(2) **E.31** The sharper the curve, the more centripetal force the train needs to accelerate around the curve. If the track can't supply it . . . the train will derail (move off the track along the tangent of the curve).

(2) **E.35** At the bottom of each swing. Your real weight is down, and fictitious force you feel due to the centripetal acceleration is down, too.

(2) **E.37** As the salad undergoes rapid centripetal acceleration, the water travels in straight lines and runs off the salad. The adhesion force of the water is not strong enough to supply the centripetal force to keep the salad on a circular path.

P. 5 The centipetal acceleration has to be equal to $g = 9.8 \frac{m}{s^2}$

$\rightarrow a = \frac{v^2}{r}$, $a = 9.8 \frac{m}{s^2}$

(2) $v = \sqrt{a \cdot r}$

$v = \sqrt{9.8 \frac{m}{s^2} \cdot 100 m}$

$v = 31.3 \frac{m}{s}$ //

P. 6 (unrealistic problem, due to air drag on satellite)

a.) see P. 5:

(2) $v = \sqrt{a \cdot r}$

$v = \sqrt{9.8 \frac{m}{s} \cdot 6,375,000 m}$

$v = 7904 \frac{m}{s}$ //

P. 6 b.) Distance = circumference

$C = 2 \pi r$

$C = 2\pi \cdot 6,375,000 m$ (2)

$C = 40,000,000 m$

$T = \frac{C}{v} = \frac{40,000,000 m}{7904 m/s}$

$T = 5,067 s \approx 1 hr\ 24 min$ //

P. 7 $a = \frac{v^2}{r} = \frac{(1 m/s)^2}{0.05 m}$

$a = 20 \frac{m}{s^2}$ // (2)

P. 8

$F = m \cdot a = 0.001 kg \cdot 20 \frac{m}{s^2}$

$F = 0.02 N$ // (2)