P # 15

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$r = 6.37 \times 10^6$ m

$t = 24 \text{ hrs} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = 86{,}400 \text{ sec}$

a) $v_t = \frac{2 \cdot \pi \cdot r}{t} = \frac{2 \cdot \pi \cdot (6.37 \times 10^6 \text{ m})}{(86{,}400 \text{ sec})} = 463 \text{ m/s}$

$a_c = \frac{v_t^2}{r} = \frac{(463 \text{ m/s})^2}{(6.37 \times 10^6 \text{ m})}$

$\boxed{a_c = 3.37 \times 10^{-2} \text{ m/s}^2}$

b) $r = 0$ m at the North Pole

$v_t = \frac{2 \cdot \pi \cdot r}{t} = \frac{2 \cdot \pi \cdot (0 \text{ m})}{t} = 0 \text{ m/s}$

$a_c = \frac{v_t^2}{r} = \frac{(0 \text{ m/s})^2}{(0 \text{ m})}$

$\boxed{a_c = 0 \text{ m/s}^2}$