

HOMEWORK SET 20: ORBITAL TRANSFERS

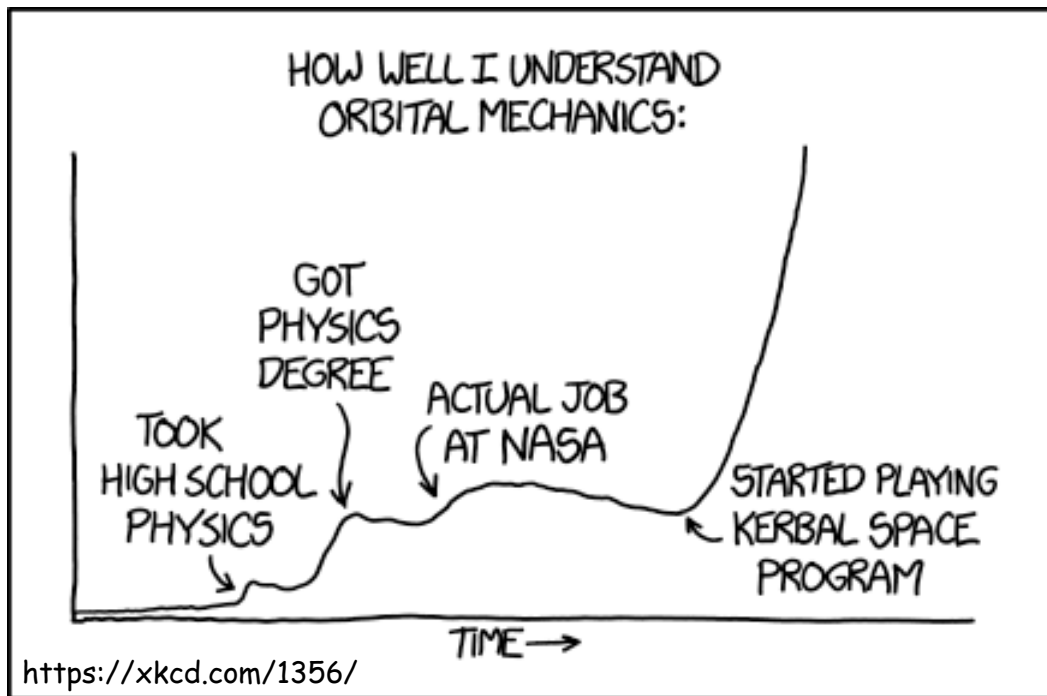
Due Wednesday, November 29, 2023

PROBLEMS FROM TM5

1) 8-38 Calculate the minimum ΔV required to place a satellite already in the Earth's heliocentric orbit (assumed circular) in to the orbit of Venus (also assumed circular and coplanar with the Earth). Consider only the gravitational attraction of the Sun. What time of flight would such a trip take?

2) 8-42 A spacecraft of mass 10,000 kg is parked in a circular orbit 200 km above the Earth's surface. What is the minimum energy required (neglect the fuel mass burned) to place the satellite in a synchronous orbit (i.e. $T_{\text{geosynchronous}} = T_{\text{surface}} = 24 \text{ hr}$)?

HINT: Find $r_{\text{geosynchronous}}$ from $v_{\text{orbit}} = (2\pi r / T_{\text{surface}})$ and $(GM_{\text{Earth}}/r^2) = (mv^2/r)$.



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