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1) Prussing & Conway, 5.1
   a) For a given space triangle, determine the expressions for the terminal velocity vectors $\boldsymbol{V_{1m}}$ and $\boldsymbol{V_{2m}}$ on the minimum energy orbit between P_1 and P_2 in terms of the unit vectors $\boldsymbol{u_c}, \boldsymbol{u_1}$, and $\boldsymbol{u_2}$.
   b) Interpret the directions of these velocity vectors geometrically in terms of the unit vector directions.

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2) Prussing & Conway, 5.2

   Consider the earth and Jupiter to be in coplanar circular orbits of radii 1 au and 5.2 au, respectively.

   a) Considering the transfer angle $\Delta\theta$ as a variable, determine the range of values of a_m for all the possible earth-Jupiter transfer ellipses.
   b) For $\Delta\theta = 150°$ and $a = 5$ au, calculate the values of a_m (in au), $t_m, t_f, t_f^\#$ and t_p (in years).
   c) Calculate $\boldsymbol{V_1}$ and $\boldsymbol{V_1^\#}$ (in EMOS) for the two transfer ellipses of (b).
   d) Calculate the magnitudes of $\boldsymbol{V_1}$ and $\boldsymbol{V_1^\#}$.
   e) Calculate p and $\tilde{p}$ (in au) along with e and $\tilde{e}$.

   Note: 1 au is the mean distance between the earth and the sun, 1.495978×10^8 km.
   1 EMOS = 1 Earth Mean Orbital Speed = mean speed of earth in its orbit about the sun, 29.78 km/s.

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3) Prussing & Conway, 5.7

   For the case $r_1 = r_2 \equiv r_0$ and arbitrary transfer angle $\Delta\theta$,

   a) Construct the locus of the focus.
   b) For a value of a equal to r_0 determine the values of e and $\tilde{e}$ and the corresponding values of p and $\tilde{p}$.

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4) Derive equation (8.26) in the class notes for t_p, the transfer time on a parabolic orbit between points P_1 and P_2. Start with equation (8.15) for an elliptic orbit, proceed to the limit as $a \to \infty$. Be sure to account for the two cases $\Delta\theta \leq \pi$ and $\Delta\theta > \pi$.

   Hint: Define $\varepsilon = 1/a$ and take the limit as $\varepsilon \to 0$. If your knowledge of Taylor series expansions is rusty, the solution of this problem is provided under Course Documents.
