1a) \[ g = \frac{4}{3} \pi G \rho a \]

\[ f = \frac{4 \pi^2 a}{g} = \frac{\Delta \omega^2 a}{\pi G \rho} \]

\[ 3 = \frac{3.5 \pi^2}{\pi G \rho} \]  

1b) \[ f = 0.0017 \]

\[ \Omega = 2.05 \times 10^{-5} \text{ rad s}^{-1} \]

\[ r = 3160 \text{ kg m}^{-2} \]

1c) \[ a - c = f a = \frac{3 \pi^2 a}{\pi G \rho} = 8.8 \pi \]

\[ \omega = 9.7 \times 10^{-7} \text{ rad s}^{-1} \]

1d) If a "foz" is shaped like it was spinning freely,

\[ f = a - c = 0.048 \Rightarrow \Delta \Omega = 5.6 \times 10^{-5} \text{ s}^{-1} \Rightarrow \text{ period} = 30.1 \text{ hours} \]

2a) \[ S = R \Delta \theta \]

\[ S = 0.3 \text{ rad}, \]  \[ P = 200 \text{ s}, \]  \[ \Delta \theta = 0.0072^\circ \]

2b) \[ w_i = 200 \text{ s} \tan \Delta \theta = 0.225 \text{ rad} \]

\[ \dot{w} = \frac{3}{0.225} = 9.2 \text{ rad/s} \]  

2c) \[ w = 2100 \pi \Rightarrow \theta = 82.8^\circ \]

poorly done

2d) \[ w_i = 4400 \pi \tan(\theta + \Delta \theta) - 4400 \pi \theta \Rightarrow w = 1.59 \pi \]

\[ \text{shot frequency} = \frac{3}{1.59} = 1.9 \text{ shots/s} \]

poorly done

2e) \[ \text{power} = \frac{\text{energy}}{\text{time}} \]

\[ \text{power} = \left( \frac{\text{distance}}{\text{time}} \right)^2 \left( \frac{\text{shot freq}}{\text{shot freq}} \right) = 21 \text{ shots} \]

3a) It's probably easier to fill in holes than remove mountain peaks. Rain is good at transporting sediments to lowlands, but has not completely removed topography. IMPACTS probably also have a hard time removing mountain peaks (small targets)

5b) Probably a combination of active volcanic/eruptive and lack of mountain-building processes. Earth has held, Man has resisted.

4a) \[ h = 1 \]  

4b) \[ h = 2.5 \]  

4c) \[ h = \frac{2g f}{a^2 a} = 1.94 \]  

4d) \[ c = 0.32 \text{ more mass concentrated towards the curve} \]

4e) \[ h = 2.83 \text{ c = 0.43 > 0.4!} \]

The problem is that Man is not behaving like a fluid, so we can't use this approach.