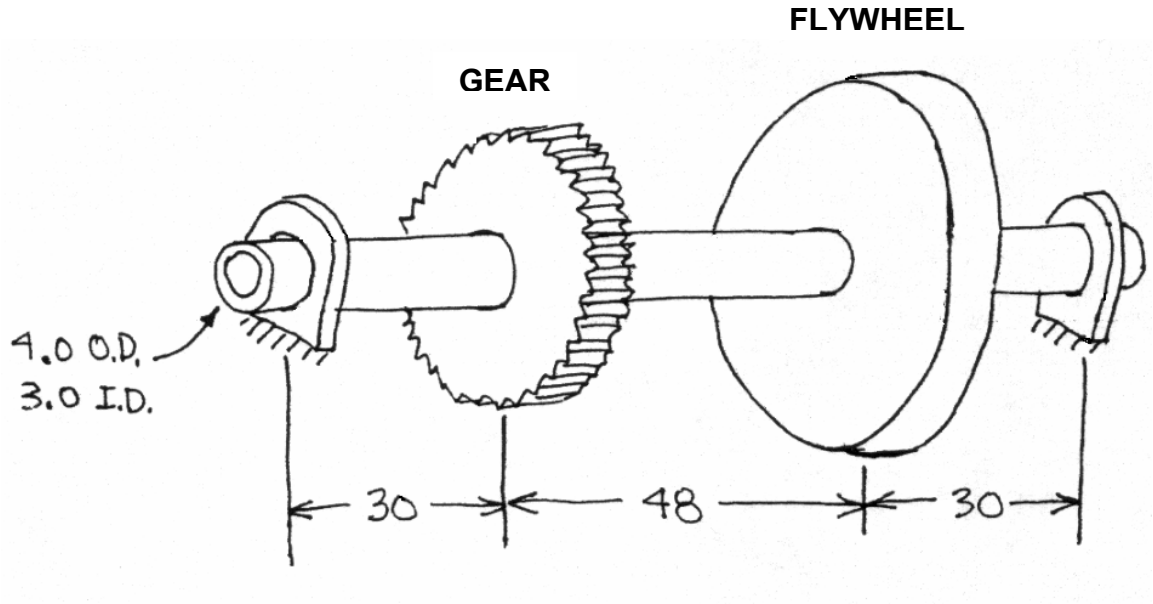
ME312 Homework: Rotating System Vibration



GEAR: Weight = 200 LB., J = 30 LB IN SEC^2

FLYWHEEL: Steel, 4 inches thick, 27 inches diameter

SHAFT: Steel, E = 30 MPSI, G = 11.5 MPSI

Notes: 1) Neglect the weight of the tubular shaft.
2) Density of steel = 0.282 LB/in^3
3) All dimensions are in inches.

A. Find the first torsional frequency, in Hertz.

B. Find the first lateral (bending) frequency, in Hertz.

C. Extra Credit: If the gear is basically a steel disk, what are its thickness and diameter?