Name: ________________________________

1 (12) _____
2 (16) _____
3 (12) _____
4 (16) _____
5 (15) _____
6 (16) _____
7 (12) _____

2 Hours, 15 Minutes, Closed Book, Closed Notes (one standard 3 inch by 5 inch note card front and back OK)

- Please show all work in your Green Book;
- Please clearly indicate your final answers in your Green Book;
- For credit, you must show calculations and free-body diagrams that support your answers.

The following expressions and tables may be of use:

\[ F = F \frac{dx}{dt} \hat{i} + F \frac{dy}{dt} \hat{j} + F \frac{dz}{dt} \hat{k} \]
\[ M = r \times F = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ r_x & r_y & r_z \\ F_x & F_y & F_z \end{vmatrix} \]
\[ M = Fd \]
\[ P \cdot Q = PQ \cos \theta \]
\[ P \cdot Q = P_x Q_x + P_y Q_y + P_z Q_z \]

\[ \sum M_o = 0 \]
\[ \sum F_y = 0 \]
\[ \sum F_x = 0 \]
\[ F_{\text{max}} = \mu_s N \]
\[ A\bar{x} = \sum A_i \bar{x}_i = 0 \]
\[ A\bar{y} = \sum A_i \bar{y}_i = 0 \]
\[ I = \bar{I} + Ad^2 = 0 \]
\textbf{Fig. 7.11} Moments of inertia of common geometric shapes.