Given: \( r = \text{radius}, \)
\( W = \text{weight}, \)
\( h_s \) is same at A and B.

Find: Largest \( M \) if cylinder is not to rotate.

Since motion will impend,
\( F_A = h_s N_A \)
\( F_B = h_s N_B \)

\( \sum M_B = 0: \)
\( M - rF_A - rN_A = 0 \)
\( M = rN_A + rF_A = rN_A + r h_s N_A \)
\( M = rN_A(1 + h_s) \) \( (1) \)

\( \sum F_x = 0: \)
\( N_A - F_B = 0 \)
\( N_A = h_s N_B \) \( (2) \)

\( \sum F_y = 0: \)
\( N_B + F_A - W = 0 \)
\( N_B = W - h_s N_A \) \( (3) \)

Substitute for \( N_B \) from \( (3) \) into \( (2) \):
\( N_A = h_s (W - h_s N_A) \)
\( N_A (1 + h_s^2) = h_s W \)
\( N_A = \frac{h_s W}{1 + h_s^2} \)

Substitute for \( N_A \) into \( (1) \):
\( M = r \frac{h_s W}{(1 + h_s^2)} (1 + h_s) \)
\( M = W r h_s \left( \frac{1 + h_s^2}{1 + h_s^2} \right) \)