ARCH 324 - Structures 2, Winter 2009

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Given: \( A_s = 2 \text{in}^2 \)
\( f_y = 60 \text{ksi} \)
\( f'c = 3 \text{ksi} \)

Find \( M_u \)

**Step 1:**
\[
A_c = \frac{A_s f_y}{0.85 f'c} = \frac{2 (60)}{0.85 (3)} = 47.06
\]

**Step 2:**
Find where \( A_c \) lies on shape
\[
47.06 - 24 = 23.06 \text{in}^2
\]
\[
16 \times 23.06 \quad x = 1.44
\]

**Step 3:**
Since shape is not rectangular do not use \( \frac{a}{2} \) but rather find centroid of area
\[
\bar{y} = \frac{\sum A_d}{\sum A}
\]
I'll choose top as baseline
d is distance from centroid of shape to baseline
\[
\frac{24 (2) + 23.04 (3.72)}{24 + 23.04} = 2.84 \text{in}
\]

**Step 4:**
\[ z = d - \bar{y} \]
\[ z = 18 - 2.84 \]
\[ z = 15.16'' \]

**Step 5:**
\[ M_u = 0.9 A_s f_y z = 0.9 (2) (60) 15.16 = 1637.28 \text{KIN} \]
\[ = 136.4 \text{KFT} \]