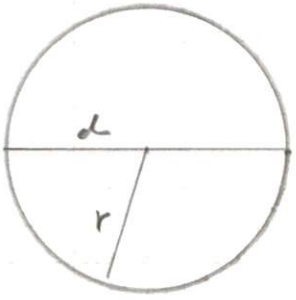
8-2. Verify that the radius of gyration for a circle of diameter d with respect to a centroidal axis is $\overline{r} = d / 4$.
Solution.



Area of a Circle

$$A = \pi r^2 \qquad d = 2r \Rightarrow r = \frac{d}{2}$$

and $$A = \frac{\pi d^2}{4}$$

This formula for the area of a circle is used frequently in strengths problems.

From Table 8-1

$$\overline{I}_x = \frac{\pi d^4}{64}$$

$$\overline{r}_x = \sqrt{\frac{\overline{I}_x}{A}} = \sqrt{\frac{\frac{\pi d^4}{64}}{\frac{\pi d^2}{4}}} = \sqrt{\frac{d^2}{16}} = \frac{d}{4}$$