

HW2, problem 9.10
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We need to find $z = T(r)$ which will transform gray level r to z
From diagram for $p_r(r)$ PDF, we see that

$$p_r(r) = 2 - 2r$$

and from diagram of $p_z(z)$ we see that

$$p_z(z) = 2z$$

Assuming a transformation that meets the form given by equation (3.3-4),
then we write

$$\frac{dz}{dr} = \frac{d}{dr}T(r) = p_r(r)$$

Hence $\frac{d}{dr}T(r) = 2 - 2r$ or $T(r) = \int_0^r (2 - 2x) dx$ where x is dummy variable
Hence

$$T(r) = 2r - r^2$$