Homework 8 continued

Problem 3)

$$(p \odot p)(t) = \frac{1}{\sqrt{2\pi}} \int_{\max(0,\,-t)}^{\min(1,\,1-t)} 1 \; dz = \frac{1}{\sqrt{2\pi}} \left[\min(1, 1-t) - \max(0, -t) \right]$$

case 1 : $t < -1$

$(p \odot p)(t) = 0$ (no overlap)

case 2: $-1 < t < 0$

$$(p \odot p)(t) = \frac{1}{\sqrt{2\pi}} \left[1 + t \right]$$

case 3: $0 < t < 1$

$$(p \odot p)(t) = \frac{1}{\sqrt{2\pi}} \left[1 - t - 0 \right] = \frac{1}{\sqrt{2\pi}} (1 - t)$$

case 4: $t > 1$

$p \odot p(t) = 0$ (no overlap)

$$(p \odot p)(t) = \begin{cases} 0 & , \; |t| > 1 \\ \frac{1+t}{\sqrt{2\pi}} & , \; -1 < t < 0 \\ \frac{1-t}{\sqrt{2\pi}} & , \; 0 < t < 1 \end{cases}$$