$p_2(x) = -2 + 3(x-2) - 3(x-2)^2$
$q_2(x) = 5 + 12(x-2)^2$
$t(x) = (-2 + 3(x-2) - 3(x-2)^2)(-2 + 3(x-2) - 3(x-2)^2) - (-3(x-2)^2)(12(x-2)^2) - (12(x-2)^2)(3(x-2))$
$s(x) = \frac{(-2+3(x-2)-3(x-2)^2)}{(-2+3(x-2)-3(x-2)^2)}$