3a

$$l_1(x) = \prod_{\substack{i=0 \\ i=1}}^{3} \frac{x-x_i}{x_1-x_i} = \frac{x-x_0}{x_1-x_0} \; \frac{x-x_2}{x_1-x_2} \; \frac{x-x_3}{x_1-x_3}$$

$$= x \quad \cdot \frac{x-2}{1} \; \frac{x-3}{-2} = \frac{1}{2} x(x^2-5x+6)$$

$$= \frac{1}{2}(x^3-5x^2+6x)$$

$$l_2(x) = \prod_{\substack{i=0 \\ i\neq 2}}^{3} \frac{x-x_i}{x_2-x_i} = \frac{x-x_0}{x_2-x_0} \; \frac{x-x_1}{x_2-x_1} \; \frac{x-x_3}{x_2-x_3}$$

$$= \frac{1}{2} x \; \frac{x-1}{1} \; \frac{x-3}{-1} = -\frac{1}{2}\left(x^3-4x^2+3x\right)$$

$$l_3(x)) = \prod_{\substack{i=0 \\ i\neq 3}}^{3} \frac{x-x_i}{x_3-x_i} = \frac{x-x_0}{x_3-x_0} \; \frac{x-x_1}{x_3-x_1} \; \frac{x-x_2}{x_3-x_2}$$

$$= \frac{1}{3} x \; \frac{1}{2}(x-1)(x-2) = \frac{1}{6}(x^3-3x^2+2x)$$