1a) $D_4 = \{(0,0), (\pi/6, 1/2), (\pi/3, \sqrt{3}/2), (\pi/2, 1)\}$

$$\begin{array}{c|c}
0 & \boxed{0} \\
\pi/6 & 1/2 \\
\pi/3 & \sqrt{3}/2 \\
\pi/2 & 1
\end{array}$$

$$\frac{1/2 - 0}{\pi/6 - 0} = \boxed{\frac{6}{2\pi}}$$

$$\frac{\sqrt{3}/2 - 1/2}{\pi/3 - \pi/6} = \frac{6\sqrt{3}-6}{2\pi}$$

$$\frac{1 - \sqrt{3}/2}{\pi/2 - \pi/3} = \frac{-6\sqrt{3}+12}{2\pi}$$

$$\frac{\frac{6\sqrt{3}-6}{2\pi} - \frac{6}{2\pi}}{\pi/3 - 0} = \boxed{\frac{18\sqrt{3}-36}{2\pi^2}}$$

$$\frac{\frac{-6\sqrt{3}+12}{2\pi} - \frac{6\sqrt{3}-6}{2\pi}}{\pi/2 - \pi/6} = \frac{-36\sqrt{3}-18}{2\pi^2}$$

⇓

$$\frac{18\sqrt{3}-36}{2\pi^2}$$
$$\frac{-36\sqrt{3}-18}{2\pi^2}$$

$$\frac{\frac{-36\sqrt{3}-18}{2\pi^2} - \frac{18\sqrt{3}-36}{2\pi^2}}{\pi/2 - 0}$$

$$\|$$

$$\boxed{\frac{-108\sqrt{3}+36}{2\pi^3}}$$

$$\boxed{P_4(x) = \frac{6}{2\pi}(x) + \frac{18\sqrt{3}-36}{2\pi^2}(x)(x-\pi/6) + \frac{-108\sqrt{3}+36}{2\pi^3}(x)(x-\pi/6)(x-\pi/3)}$$

or

$$\begin{array}{c|c}
0 & 0 \\
\pi/6 & 1/2 \\
\pi/3 & \sqrt{3}/2 \\
\pi/2 & 1
\end{array}$$

$$\boxed{\frac{3}{\pi}}$$

$$\frac{3(\sqrt{3}-1)}{\pi}$$

$$\frac{3(2-\sqrt{3})}{\pi}$$

$$\boxed{\frac{9(\sqrt{3}-2)}{\pi^2}}$$

$$\frac{9(3-2\sqrt{3})}{\pi^2}$$

$$\boxed{\frac{18(5-3\sqrt{3})}{\pi^3}}$$

$$\boxed{P_4(x) = \frac{3}{\pi}(x) + \frac{9(\sqrt{3}-2)}{\pi^2}(x)(x-\pi/6) + \frac{18(5-3\sqrt{3})}{\pi^3}(x)(x-\pi/6)(x-\pi/6)}$$