1 Basis Functions

1.1 P2

$$\phi_{j-3/2} = \begin{cases} \frac{9}{2}\left(\xi+\frac{2}{3}\right)\left(\xi+\frac{1}{3}\right) & -1 \le \xi \le -\frac{1}{3} \\ 0 & else \end{cases}$$

$$\phi_{j-1} = \begin{cases} -9\left(\xi+1\right)\left(\xi+\frac{1}{3}\right) & -1 \le \xi \le -\frac{1}{3} \\ 0 & else \end{cases}$$

$$\phi_{j-1/2} = \begin{cases} \frac{9}{2}\left(\xi+\frac{2}{3}\right)\left(\xi+1\right) & -1 \le \xi \le -\frac{1}{3} \\ \frac{9}{2}\xi\left(\xi-\frac{1}{3}\right) & -\frac{1}{3} \le \xi \le \frac{1}{3} \\ 0 & else \end{cases}$$

$$\phi_{j} = \begin{cases} -9\left(\xi+\frac{1}{3}\right)\left(\xi-\frac{1}{3}\right) & -\frac{1}{3} \le \xi \le \frac{1}{3} \\ 0 & else \end{cases}$$

$$\phi_{j+1/2} = \begin{cases} \frac{9}{2}\xi\left(\xi+\frac{1}{3}\right) & -\frac{1}{3} \le \xi \le \frac{1}{3} \\ \frac{9}{2}\left(\xi-1\right)\left(\xi-\frac{2}{3}\right) & \frac{1}{3} \le \xi \le 1 \\ 0 & else \end{cases}$$

$$\phi_{j+3/2} = \begin{cases} \frac{9}{2}\left(\xi-\frac{1}{3}\right)\left(\xi-\frac{2}{3}\right) & \frac{1}{3} \le \xi \le 1 \\ 0 & else \end{cases}$$

1.2 P1

$$w^{+}_{j-3/2} = \begin{cases} -\frac{3}{2}\left(\xi+\frac{1}{3}\right) & -1 \le \xi \le -\frac{1}{3} \\ 0 & else \end{cases}$$

$$w^{-}_{j-1/2} = \begin{cases} \frac{3}{2}\left(\xi+1\right) & -1 \le \xi \le -\frac{1}{3} \\ 0 & else \end{cases}$$

$$w^{+}_{j-1/2} = \begin{cases} -\frac{3}{2}\left(\xi-\frac{1}{3}\right) & -\frac{1}{3} \le \xi \le \frac{1}{3} \\ 0 & else \end{cases}$$

$$w^{-}_{j+1/2} = \begin{cases} \frac{3}{2}\left(\xi+\frac{1}{3}\right) & -\frac{1}{3} \le \xi \le \frac{1}{3} \\ 0 & else \end{cases}$$

$$w^{+}_{j+1/2} = \begin{cases} -\frac{3}{2}\left(\xi-1\right) & \frac{1}{3} \le \xi \le 1 \\ 0 & else \end{cases}$$

$$w^{-}_{j+3/2} = \begin{cases} \frac{3}{2}\left(\xi-\frac{1}{3}\right) & \frac{1}{3} \le \xi \le 1 \\ 0 & else \end{cases}$$