LSN 32 Board Problem - Problem 2, page 672 (text)

```
f[x_, y_, yp_] = 2 * y^3
```

$$2\,y^3$$

```
a = -1; α = 1 / 2; b = 0; β = 1 / 3; h = .25;
```

```
g1 = 2 * w1 - w2 + h^2 * f[a + h, w1, (w2 - α) / (2 * h)] - α
```

$$-\frac{1}{2} + 2\,w1 + 0.125\,w1^3 - w2$$

```
g2 = -w1 + 2 * w2 - w3 + h^2 * f[a + 2 * h, w2, (w3 - w1) / (2 * h)]
```

$$-w1 + 2\,w2 + 0.125\,w2^3 - w3$$

```
g3 = -w2 + 2 * w3 + h^2 * f[a + 3 * h, w3, (β - w2) / (2 * h)] - β
```

$$-\frac{1}{3} - w2 + 2\,w3 + 0.125\,w3^3$$

```
J = {{D[g1, w1], D[g1, w2], D[g1, w3]},
  {D[g2, w1], D[g2, w2], D[g2, w3]}, {D[g3, w1], D[g3, w2], D[g3, w3]}}
```

$$\{\{2 + 0.375\,w1^2, -1, 0\}, \{-1, 2 + 0.375\,w2^2, -1\}, \{0, -1, 2 + 0.375\,w3^2\}\}$$

```
F = {{g1}, {g2}, {g3}}
```

$$\left\{\left\{-\frac{1}{2} + 2\,w1 + 0.125\,w1^3 - w2\right\}, \{-w1 + 2\,w2 + 0.125\,w2^3 - w3\}, \left\{-\frac{1}{3} - w2 + 2\,w3 + 0.125\,w3^3\right\}\right\}$$

```
w = {{w1}, {w2}, {w3}}
```

$$\{\{w1\}, \{w2\}, \{w3\}\}$$

```
w1 = 1; w2 = 1; w3 = 1;
```

```
W1 = w - Inverse[J].F
```

$$\{\{0.5386642572\}, \{0.5293276109\}, \{0.4684888186\}\}$$

```
w1 = 0.5386642572095475; w2 = 0.5293276108726753; w3 = 0.46848881861305636;
```

```
W2 = w - Inverse[J].F
```

$$\{\{0.4473208645\}, \{0.40423998\}, \{0.3665549757\}\}$$

```
w1 = 0.4473208644974583; w2 = 0.4042399799839081; w3 = 0.36655497572911006;
```

```
W3 = w - Inverse[J].F
```

$$\{\{0.4445886051\}, \{0.4001605795\}, \{0.3637396783\}\}$$