Chapter 8

Chapter 8.1

8.1.8

(ab) First steps:

$$y(0.025) \approx 2 + (0.025)(5 * 0 - 3\sqrt{2}) \tag{3.1}$$
$$= 1.893933983 \tag{3.2}$$
$$y(0.0125) \approx 2 + (0.0125)(5 * 0 - 3\sqrt{2}) \tag{3.3}$$
$$= 1.946966991 \tag{3.4}$$

(cd) We start with the equation

$$y_{n+1} = y_n + h(5t_{n+1} - 3\sqrt{y_{n+1}}) \tag{3.5}$$
$$0 = -(\sqrt{y_{n+1}})^2 - 3h\sqrt{y_{n+1}} + (y_n + 5(t+h)h) \tag{3.6}$$
$$\tag{3.7}$$

Choose the positive root and square to obtain a formula for y_{n+1}.

8.1.19

By the chain rule,

$$\phi''(t) = 5 - \frac{3}{2\sqrt{y}}(5t - 3\sqrt{y}) = 5 - (\frac{15t^*}{2\sqrt{\phi(t*)}} - \frac{9}{2}) = \frac{1}{2}(19 - 15\frac{t^*}{\sqrt{\phi(t^*)}})$$

where $t*$ in some value between t and $t+h$. So

$$e_n = \frac{h^2}{4}(19 - 15\frac{t^*}{\sqrt{\phi(t^*)}})$$