1993-CE-A-MATH-1-Q01

1(a)

$$
\begin{aligned}
&(\sqrt{2(x+\Delta x)}-\sqrt{2x})(\sqrt{2(x+\Delta x)})+\sqrt{2x}) \\
&= (\sqrt{2(x+\Delta x)})^2-(\sqrt{2x})^2 \\
&= 2(x+\Delta x)-2x \\
&= 2\Delta x
\end{aligned}
$$

1(b)

$$
\begin{aligned}
&\frac{d}{dx}(\sqrt{2x}) \\
&= \lim_{\Delta x \to 0} \frac{\sqrt{2(x+\Delta x)}-\sqrt{2x}}{\Delta x} \\
&= \lim_{\Delta x \to 0} \frac{(\sqrt{2(x+\Delta x)}-\sqrt{2x})(\sqrt{2(x+\Delta x)})+\sqrt{2x})}{\Delta x(\sqrt{2(x+\Delta x)})+\sqrt{2x})} \\
&= \lim_{\Delta x \to 0} \frac{2\Delta x}{\Delta x(\sqrt{2(x+\Delta x)})+\sqrt{2x})} \\
&= \lim_{\Delta x \to 0} \frac{\sqrt{2}}{\sqrt{(x+\Delta x)})+\sqrt{x}} \\
&= \frac{\sqrt{2}}{2\sqrt{x}} \\
&= \frac{1}{\sqrt{2x}}
\end{aligned}
$$