1. $f(x) = x^2 + x - 1$

$\frac{dy}{dx} = 2x + 1$

$dx\left(\frac{dy}{dx}\right) = (2x+1)\,dx$

$dy = (2x+1)\,dx$

$dy = (2 \cdot 1 + 1)\,0.01$

$= 3(.01)$

$= \boxed{0.03}$

$\Delta y = f(x + \Delta x) - f(x)$

$\Delta y = f(1 + .01) - f(1)$

$= f(1.01) - f(1)$

$= (1.01)^2 + (1.01) - 1 - (1^2 + 1 - 1)$

$= 1.0201 + .01 - 1$

$= 1.0301 - 1$

$= \boxed{0.0301}$

2. $f(x) = x^{-\frac{1}{2}} = \frac{1}{x^{1/2}} = \frac{1}{\sqrt{x}}$

$\frac{dy}{dx} = -\frac{1}{2}x^{-\frac{3}{2}}$

$dy = \left(\frac{-1}{2x^{3/2}}\right)dx$

$= \left(\frac{-1}{2 \cdot 1^{3/2}}\right)dx$

$dy = -\frac{1}{2}\,dx$

$\Delta y = f(x + \Delta x) - f(x)$

$= f(1 + \Delta x) - f(1)$

$= \frac{1}{\sqrt{1+\Delta x}} - \frac{1}{\sqrt{1}}$

$\Delta y = \frac{1}{\sqrt{1+\Delta x}} - 1$