Evaluate the derivatives.

1. $H(x) = \sqrt[3]{\dfrac{4-2x}{5}}$ $= \dfrac{1}{\sqrt[3]{5}}(4-2x)^{1/3}$

$H'(x) = \dfrac{1}{\sqrt[3]{5}} \cdot \dfrac{1}{3}(4-2x)^{-2/3}(-2) = \dfrac{-2}{3\sqrt[3]{5}\,(4-2x)^{2/3}}$

2. $y = e^{\sec\theta}$

$y' = (\sec\theta \tan\theta)e^{\sec\theta}$

3. $f(x) = \dfrac{8}{x^2+\sin(x)}$ $= 8(x^2+\sin x)^{-1}$

$f'(x) = -8(x^2+\sin x)^{-2}(2x+\cos x) = \dfrac{-8(2x+\cos x)}{(x^2+\sin x)^2}$

4. $x(t) = \dfrac{1}{\sqrt{2}}\tan(\dfrac{\pi}{6} - x)$

$x'(t) = \dfrac{1}{\sqrt{2}} \cdot \sec^2(\frac{\pi}{6}-x)(-1) = \dfrac{-1}{\sqrt{2}}\sec^2(\frac{\pi}{6}-x)$

5. $y = \dfrac{xe^{-\pi x^2/10}}{100}$ $= \dfrac{1}{100}\left(x e^{\frac{-\pi}{10}x^2}\right)$

$y' = \dfrac{1}{100}\left(e^{\frac{-\pi}{10}x^2} + x e^{\frac{-\pi}{10}x^2}\left(\frac{-2\pi}{10}x\right)\right) = \dfrac{e^{-\frac{\pi}{10}x^2}}{100}\left(1 - \frac{\pi}{5}x^2\right)$

6. $y = \dfrac{e^2-x}{5+\cos(5x)}$

$y' = \dfrac{(5+\cos(5x))(-1)-(e^2-x)(-\sin(5x)(5))}{[5+\cos(5x)]^2} = \dfrac{5(e^2-x)\sin(5x) - (5+\cos(5x))}{(5+\cos(5x))^2}$

7. $y = e^{2t/(1-t)} = e^{2\left(\frac{t}{1-t}\right)}$

$$y' = e^{2\left(\frac{t}{1-t}\right)}\left(2\cdot\frac{(1-t)(1)-t(-1)}{(1-t)^2}\right)$$

$$= \left(e^{\frac{2t}{1-t}}\right)\left(\frac{2}{(1-t)^2}\right)$$

8. $f(x) = \cos^3\left(\frac{8}{1+x^2}\right) = \left(\cos\left[8(1+x^2)^{-1}\right]\right)^3$

$$f'(x) = 3\left(\cos\left[8(1+x^2)^{-1}\right]\right)^2\left(-\sin\left(8(1+x^2)^{-1}\right)\right)\left(-8(1+x^2)^{-2}(2x)\right)$$

$$= \frac{48}{(1+x^2)^2}\sin\left(\frac{8}{1+x^2}\right)\cos^2\left(\frac{8}{1+x^2}\right)$$

9. $h(x) = (x + (x + \sin(2x))^5)^{1/2}$

$$h'(x) = \frac{1}{2}\left(x+(x+\sin(2x))^5\right)^{-1/2}\left(1 + 5(x+\sin(2x))^4(1+2\cos(2x))\right)$$

10. $F(x) = (2re^{rx} + n)^p$ (Assume r, n, and p are fixed constants.)

$$F'(x) = p\left(2re^{rx}+n\right)^{p-1}\left(2r\cdot re^{rx}\right)$$

$$= 2pr^2e^{rx}\left(2re^{rx}+n\right)$$