1. (a) $f(x) = \cos(3x) + \tan(2x) + e^x + \ln|1-2x|$, find $f'(0)$

$f'(x) = \sin(3x) \cdot 3 + \sec^2(2x) \cdot 2 + e^x + \dfrac{-2}{1-2x}$

$= 0 + 2 + 1 + -2$

$= 1$

(b) $f(x) = \sqrt{5x-5}^{\sqrt{5x-5}}$, find $f'(6)$

$\ln f(x) = \sqrt{5x-5}\, \ln\sqrt{5x-5}$

$\dfrac{f'(x)}{f(x)} = \dfrac{1}{2}(5x-5)^{-\frac{1}{2}} \cdot 5 \cdot \ln\sqrt{5x-5} + \sqrt{5x-5} \cdot \dfrac{1}{\sqrt{5x-5}} \cdot \dfrac{1}{2}(5x-5)^{-\frac{1}{2}} \cdot 5$

$\dfrac{f'(x)}{f(x)} = \dfrac{5\ln\sqrt{5x-5}}{2\sqrt{5x-5}} + \dfrac{\sqrt{5x-5} \cdot 5}{2\sqrt{5x-5} \cdot \sqrt{5x-5}}$

$= \dfrac{5\ln\sqrt{5x-5}}{2\sqrt{5x-5}} + \dfrac{\sqrt{5x-5}}{2x-2}$

$f'(x) = \left[\dfrac{5\ln\sqrt{5x-5}}{2\sqrt{5x-5}} + \dfrac{\sqrt{5x-5}}{2x-2} \right] \cdot \sqrt{5x-5}^{\sqrt{5x-5}}$

$f'(6) = \left[\dfrac{5\ln\sqrt{25}}{2\sqrt{25}} + \dfrac{\sqrt{25}}{12-2} \right] \cdot \sqrt{25}^{\sqrt{25}}$

$f'(6) = \left[\dfrac{5\ln 5}{10} + \dfrac{5}{10} \right] \cdot 5^5$

$= \left[\dfrac{\ln 5}{2} + \dfrac{1}{2} \right] \cdot 5^5$

$\approx 4011.25.$

2.