1. $h(x) = \tan(2^x)$

$h'(x) = f'(g(x))\,g'(x)$

$= \sec^2(g(x)) \cdot \ln(2)\, 2^x$

$= \sec^2(2^x) \cdot \ln(2)\, 2^x$

(f(stuff)
↑
2^x

$f(x) = \tan(x)$

$f'(x) = \sec^2(x)$

$g(x) = 2^x$

(R "stuff")

$g'(x) = \ln(2) \cdot 2^x$

2. $m(x) = e^{\tan(x)}$ $\left(= e^{\text{stuff}}\right)$

$m'(x) = e^{\tan(x)} \cdot \sec^2(x)$

$f'(g(x))$ $g'(x)$

$f(x) = e^x$

$f'(x) = e^x$

$g(x) = \tan(x)$

$g'(x) = \sec^2(x)$

---

3. $z(x) = \sqrt{\tan(x)}$ $\left(= \sqrt{\text{stuff}}\right)$

$= (\tan(x))^{1/2}$

$z'(x) = \dfrac{1}{2\sqrt{\tan(x)}} \cdot \sec^2(x)$

$f'(g(x))$ $g'(x)$

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

$f'(x) = \frac{1}{2}x^{\frac{1}{2}-1}$

$= \frac{1}{2}x^{-1/2} = \dfrac{1}{2\sqrt{x}}$

$g(x) = \text{stuff} = \tan(x)$

$g'(x) = \sec^2(x)$

1. $F(x) = \sqrt{1-2x}$ $\left(= \sqrt{\text{stuff}} \right.$

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

$f'(x) = \frac{1}{2\sqrt{x}}$

$F'(x) = \underbrace{\frac{1}{2\sqrt{1-2x}}}_{f'(g(x))} \cdot \underbrace{(-2)}_{g'(x)} = \frac{-2}{2\sqrt{1-2x}}$

$g(x) = \text{stuff} = 1-2x$

$g'(x) = -2$

$$\boxed{F'(x) = \frac{-1}{\sqrt{1-2x}}}$$ (simplify when it's easy)

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2. $F(x) = 6\cot(nx)$ $n \in \mathbb{R}$, a

$\left(= 6\cot(\text{stuff}) \right)$

$F'(x) = \underbrace{-6\csc^2(nx)}_{f'(g(x))} \cdot \underbrace{n}_{g'(x)}$

$f(x) = 6\cot(x)$

$f'(x) = 6\cot'(x)$

$= -6\csc^2(x)$

$g(x) = nx$

$g'(x) = n$