$\qquad$

Author 2 $\qquad$

## 13 - Chain Rule

$\qquad$

## Theorem: Chain Rule-Composition Rule

Let $f$ and $g$ be differentiable.

$$
[f(g(x))]^{\prime}=f^{\prime}(g(x)) g^{\prime}(x)
$$

1. Find the derivative of $f(x)=e^{x} \tan (3 x)$.
2. Use the chain rule and NO quotient rule to find the derivative of $g(x)=\frac{2}{x^{5}+\sin x}$.

## Theorem: Derivative of $a^{x}$

If $a>0$, then $\frac{d}{d x}\left(a^{x}\right)=a^{x} \ln (a)$.
3. Evaluate the following derivatives.
(a) $\frac{d}{d x}[\cos (3 x)]$
(b) $\frac{d}{d x}\left[e^{-4 x}\right]$
(c) $\frac{d}{d x}[\sqrt[3]{\sqrt{x} \sec (x)}]$
(d) $\frac{d}{d x}\left[e^{7 x} \sin \left(\pi^{x}-\cos x\right)\right]$
(e) $\frac{d}{d x}\left[\cos ^{5}\left(\frac{3 x}{1+\tan x}\right)\right]$

