MAT 136 (Calculus I), Prof. Jim Swift
In-Class Worksheet: Derivative Shortcuts 5.

1. The function $y = \sin(x^2)$ is a composition of functions, $y = f(g(x))$, with

$f(u) =$ and $g(x) =$. Compute the derivatives of f and g:

$f'(u) =$ and $g'(x) =$. Practice the "eff of ex" notation:

$f'(x) =$, $f'(y) =$, $f'(3u) =$, $f'(x^2) =$.

Now evaluate the derivative, using the chain rule: $\frac{d}{dx} f(g(x)) = f'(g(x)) \cdot g'(x)$

$\frac{d}{dx} \sin(x^2) =$

2. Let $h(x) = (x^2 + 3)^2$. Compute $h'(x)$ in two ways:

(a) By expanding $h(x)$ to write it as a polynomial in standard form and then differentiating with the "old" rules.

(b) Using the chain rule.

3. Differentiate $h(x) = (x^2 + 3)^{10}$. Note: One of methods (a) or (b) is very very much work.