For the exam, you should know by heart or be able to determine very quickly the following derivatives:

Function	**Derivative**
$f(x) = c$ where c is a constant	$f'(x) = 0$
$f(x) = x$	$f'(x) = 1$
$f(x) = x^n$	$f'(x) = nx^{n-1}$
$f(x) = e^x$	$f'(x) = e^x$
$f(x) = a^x$	$f'(x) = \ln(a)a^x$
$f(x) = \sin(x)$	$f'(x) = \cos(x)$
$f(x) = \cos(x)$	$f'(x) = -\sin(x)$
$f(x) = \tan(x)$	$f'(x) = (\sec(x))^2$
$f(x) = \sec(x)$	$f'(x) = \sec(x)\tan(x)$
$f(x) = \csc(x)$	$f'(x) = -\csc(x)\cot(x)$
$f(x) = \cot(x)$	$f'(x) = -(\csc(x))^2$
$f(x) = \arcsin(x)$	$f'(x) = \dfrac{1}{\sqrt{1-x^2}}$
$f(x) = \arccos(x)$	$f'(x) = \dfrac{-1}{\sqrt{1-x^2}}$
$f(x) = \arctan(x)$	$f'(x) = \dfrac{1}{1+x^2}$
$f(x) = \ln(x)$	$f'(x) = \dfrac{1}{x}$
$f(x) = \log_a(x)$	$f'(x) = \dfrac{1}{\ln(a)x}$

You should also know how to take derivatives of combinations of functions using the following rules:

Function	**Name of Rule**	**Derivative**
$y = cf(x)$	Constant Multiple Rule	$y' = cf'(x)$
$y = f(x) + g(x)$	Sum Rule	$y' = f'(x) + g'(x)$
$y = f(x) - g(x)$	Difference Rule	$y' = f'(x) - g'(x)$
$y = f(x)g(x)$	Product Rule	$y' = f'(x)g(x) + f(x)g'(x)$
$y = \dfrac{f(x)}{g(x)}$	Quotient Rule	$y' = \dfrac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$
$y = f\big(g(x)\big)$	Chain Rule	$y' = f'\big(g(x)\big)g'(x)$

BE CAREFUL. These rules only work if f and g are DIFFERENTIABLE.
With quotients, we also need to check that $g(x)$ is not equal to 0.

You should also be able to use these rules to find derivatives of more complicated functions that you don't have to memorize. For example:

1.
$$\begin{aligned}\frac{d}{dx}\big(f(x)g(x)h(x)\big) &= f'(x)g(x)h(x) + f(x)\big(g(x)h'(x) + g'(x)h(x)\big) \\ &= f'(x)g(x)h(x) + f(x)g(x)h'(x) + f(x)g'(x)h(x)\end{aligned}$$

2.
$$\frac{d}{dx}\left(f\left(g\left(h(x)\right)\right)\right) = f'(x)\left(g\left(h(x)\right)\right)g'\left(h(x)\right)h'(x)$$

3.
$$\begin{aligned}\frac{d}{dx}\left(\frac{f(x)g(x)}{h(x)}\right) &= \frac{h(x)\left(f'(x)g(x) + f(x)g'(x)\right) + f(x)g(x)h'(x)}{(h(x))^2} \\ &= \frac{h(x)f'(x)g(x) + f(x)f(x)g'(x) + f(x)g(x)h'(x)}{(h(x))^2}\end{aligned}$$