

Name: _____

MA1 Exam 4 Review Sheet

Exam 4 will be on Tuesday, December 11, 2007. The exam is cumulative, but the following topics will be emphasized: higher order derivatives; implicit differentiation; equations of tangent lines and normal lines; finding intervals on which a function is increasing and decreasing; critical points; and finding relative extrema. *Calculators are not permitted on this exam. Be sure to show all steps clearly using the calculus techniques shown in class. A correct answer with no justification will receive no credit.*

1. Which derivative of $y = (x - 2)^4$ must equal zero?
2. If $y = \frac{x + 2}{x - 3}$, then find $\frac{d^2y}{dx^2}$.
3. If $f(x) = \sin 2x$, find $f''(x)$.
4. If $f(x) = \tan x$, find $f''(x)$.
5. If $f(x) = \sin x + \cos x$, find $f''(x) + f'(x)$.
6. Find $\frac{dy}{dx}$ if $x + y = xy$.
7. Find the equation of the tangent line to the graph of $x^2 - y^2 = 27$ at the point $(6, -3)$.
8. Find the intervals on which $f(x)$ is increasing: $f(x) = x^3 + 6x^2 + 9x + 1$.
9. For what value(s) of x does $4x^6 - 8x^3 + 18$ have a relative minimum?
10. Let f be the function defined by $f(x) = \frac{4x - 8}{x^2 + 5x - 14}$. Write an equation of the line normal to the graph of f at $x = 1$.
11. Find the value of c if the line $y = 4x + 3$ is tangent to the curve $y = x^2 + c$.
12. Find $\frac{dy}{dx}$ at the point $(2, -3)$ if $y^2 - 2xy = 21$.
13. Write the equation of the line tangent to the curve $y = x \sin x$ at the point $(\pi, 0)$.