Bronx High School of Science
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Name: _____ **MA2 Exam 5 Review Sheet**

Exam 5 will be on **Tuesday, June 5, 2007**. All problems must be answered using calculus techniques. For full credit, final answers must be *exact* (not rounded), *in simplest form*, and include appropriate *units* unless otherwise indicated; denominators should be *rationalized* and answers should be written with *positive exponents only*. Put a box around your final answer. Graphing calculators, though not required, are recommended for this exam, however the following calculators may *not* be used: TI-89, TI-92, or any calculator with symbolic manipulation abilities.

The following are the topics that may be covered on the final exam:

- Properties of Derivatives and Properties of Integrals
- Product Rule, Quotient Rule, Chain Rule, Power Rule
- Finding the slope of a tangent/normal line and writing the equation of a tangent/normal line at a given point.
- Higher-order derivatives (e.g. second derivative, third derivative)
- Differentiating and integrating polynomial functions, rational functions, trig functions, e^u and $\ln u$.
- Using *u*-substitution to evaluate an integral.
- Computing definite integrals using the Fundamental Theorem of Calculus.
- The area under a curve or between two curves.
- Finding the volume of solids of revolution using the disc/washer method.

1. Find $f'(x)$ if $f(x)=\dfrac{2x+1}{x-1}$.
2. Find $g'(x)$ if $g(x)=x^2\cos^3(4x)$.
3. Evaluate: $\int_1^4 x^{-3}dx$.
4. Evaluate: $\int 2e^x\cos(e^x)\,dx$.
5. Evaluate: $\int 4t\sqrt{6t^2+14}\,dt$.
6. Find $h'(x)$ if $h(x)=x^2(x-2)^4$.
7. Evaluate: $\int 4\sin^3 x\cos x\,dx$.
8. Find $f'(x)$ if $f(x)=2x+\ln(3x^2)$.
9. Find the points on the graph of $f(x)=\dfrac{1}{3}x^3+x^2-x-1$ at which the slope is (a) 1, (b) 2, and (c) 0.
10. Sketch the region bounded by the graphs of the equations $y=2x^2+10$ and $y=4x+16$ and determine its area.
11. (a) Find the equation of the tangent line to the graph of $y=x^3$ at the point (1, 1).
    (b) Sketch the graph of $y=x^3$ and its tangent line at the point (1, 1) and find the area of the region bounded by these curves.
12. Find the volume of the solid that results when the area bounded by the curve $y=x^2$ and the curve $y=4x$ is revolved about the *x*-axis.
13. Find the volume of the solid that results when the area bounded by the curve $y=9-x^2$ and the curve $y=3$ is revolved about the *x*-axis.
14. Find the volume of the solid that results when the area bounded by the curve $x=9-y^2$ and the curve $x=5$ is revolved about the *y*-axis. Set up but do not evaluate the integral.
15. Find the volume of the solid formed when the region described in problem 11 (b) is revolved about the *x*-axis. Set up but do not evaluate the integral.