Bronx High School of Science
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MA2 Exam 2 Review Sheet

All problems must be answered using calculus techniques. Final answers must be *exact* (not rounded), *in simplest form* and include appropriate *units* unless otherwise indicated. Put a box around your final answer. Graphing calculators, though not required, may be used on this exam, with the following exceptions: TI-89, TI-92, or any calculator with symbolic manipulation abilities.

In 1 – 14, find $\frac{dy}{dx}$ *in simplest form*.

1. $y = e^{3x}$
2. $y = \ln 4x^2$
3. $y = \ln\left(\frac{e^x - 1}{e^x}\right)$
4. $y = \frac{1}{\ln x^2}$
5. $y = \sin^3(\ln x)$
6. $y = 3^{x^2+4x}$
7. $y = 5^{\cos x}$
8. $y = \ln\left(e^{2x} + 1\right)^2$
9. $y = 3x^4 e^x$
10. $y = \frac{e^x}{\ln x}$
11. $y = e^{-\frac{x}{3}}$
12. $y = 4e^2 + 10^{5e^2+4x}$
13. $y = e^x \sec x^2$
14. $y = e^{x\tan(\ln x)}$

15. Find the equation of the *normal* line to $y = \ln x^4$ at $x = e^3$.

16. The concentration, *C,* of a certain drug in the bloodstream *t* minutes after being ingested is given by $C(t) = e^{-t} - e^{-2t}$.
    a) Find the maximum concentration, *C*, of the drug.
    b) After how many minutes does the maximum concentration occur?

17. Given the position function $x(t) = t^4 - 8t^2$, find the distance that the particle travels from $t = 0$ to $t = 4$.

18. Given the position function $s(t) = \frac{4}{3}t^3 - 2t^2 - 8t$, $t \geq 0$, find:
    a) the interval(s) where the particle is speeding up
    b) the interval(s) where the particle is slowing down
    c) the acceleration when the particle reverses direction