Staple!

Ord: ___ ___

Honors Calc 1 MAC3472 3203 | **Exam B** | Prof. JLF King *Touch*: 18Mar2017

Note. This is an open brain, open HHA, closed book exam. Please fill in the blanks. For B2 show no work. Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

B1: Salt is being dumped, at 10 cubic feet per minute, from a conveyor belt so as to form a conical pile whose base-diameter is always twice its height. Let R denote the speed of increase in its height when the cone is 10 ft high.

___ i Use a full sheet of paper to draw the setup. Derive an equation which relates volume, v, to height, h. Eqn: ⌞ . . . . . ⌟.

___ ii Differentiate your eqn. w.r.t. time so as to relate $\frac{\mathrm{d}}{\mathrm{d}t}h$ and h and $\frac{\mathrm{d}}{\mathrm{d}t}v$.

___ iii Solving for R yields $R =$ ⌞ ⌟.
[*Hint:* Units?]

B2: z Sneha introduced a game involving Mafiosi. Circle one: **Yes.** **Ummm.** ***Who is Sneha?***

___ a Compute the slope of the tangent to ellipse

$$\frac{x^2}{9} + \frac{y^2}{36} = 1^2$$

at point $\left(1, 4\sqrt{2}\right)$. Slope= ⌞ . . . . . ⌟.

___ b Let $\varphi(x) := \int_{e+5}^{x^3+\mathsf{e}^x} \frac{\sin(t)}{t}\,\mathrm{d}t$. Use FTC to find $\varphi'(x)=$ ⌞ . . . . . ⌟.

___ c Use l'Hôpital's Thm, when applicable, to compute these limits. Write *DNE*, or $+\infty$, or $-\infty$, or a number.
$\lim_{t\searrow 0}[3+t]^{1/t} =$ ⌞ ⌟.
$\lim_{t\searrow 0}[1+3t]^{1/t} =$ ⌞ ⌟.

___ d Let R be the filled-in square with corners $(\pm 1, \pm 1)$. Rotate R about the line $x+y = 5$. Then Vol(SoR) = ⌞ ⌟.

___ e Use the subst. $u := \ln(x)$ to compute an anti-deriv. of $\frac{\sqrt[7]{\ln(x)}}{x}$. A.D.= ⌞ . . . . . ⌟.

B3: Let $f(x) := x^3 + 7 + \mathsf{e}^x$ and let N_f be the corresponding Newton's Method map. Then $N_f(z)=$ ⌞ . . . . . ⌟.

Use *a full sheet of paper* and graph f, labeling all vertical and horiz. asymptotes, and specifically showing the behavior of $f(x)$ as $x \to \pm\infty$.

The number of fixed-points of N_f is ⌞ . . . . . ⌟.
[*Hint:* You can answer this just by looking at f.]

End of Exam B

B1:	___ ___	75pts
B2:	___ ___ ___	300pts
B3:	___ ___	70pts
Total:	___ ___ ___	445pts

HONOR CODE: *"I have neither requested nor received help on this exam other than from my professor (or his colleague)."*
Name/Signature/Ord

Ord: ⌞ . . . . . ⌟ ⌞ ⌟ ⌞ ⌟