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## FINAL

MATH 121 - FALL 2003 - KUNIYUKI 126 POINTS TOTAL, BUT 120 POINTS = 100\%

Show all work, simplify as appropriate, and use "good form and procedure" (as in class). Box in your final answers; write units where appropriate!

An appropriate sheet of notes is allowed.

## USE A SCIENTIFIC CALCULATOR! DO NOT APPROXIMATE OR ROUND OFF UNLESS INSTRUCTED TO DO SO.

1) Approximate the area under the graph of $f(x)=\frac{1}{x}$ from $a=2$ to $b=14$ by finding a Left Riemann Sum using 4 rectangles of the same width. Round off to four decimal places whenever you need to round off. (14 points)
2) Flubber is consumed at the rate of $f(t)=3 t^{2}$ tons per year, where $t$ is the number of years since January 1, 2000. How much Flubber is consumed from January 1, 2002 to January 1, 2005? (9 points)
3) Find the integrals. Simplify wherever possible. (50 points total)
a) $\int_{1}^{5}\left(x^{3}-7 x^{-2}\right) d x$
(8 points)
You may write your final answer as a decimal.
b) $\int_{0}^{5} 8 e^{2 x} d x$ (7 points)
c) $\int x^{2}\left(x^{3}+9\right)^{7} d x$ (9 points)
d) $\int \frac{5 x+2}{5 x^{2}+4 x} d x$
(8 points)
e) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} d x$
(8 points)
f) $\int_{2}^{5} \frac{d x}{3-4 x}$
(10 points)
4) Find the average value of $f(x)=5 x^{2}$ on the interval $[1,4]$. (10 points)
5) Find the area bounded by the graphs of $y=x^{2}+2$ and $y=5-2 x$. (16 points)
6) Find the domain of $f(x, y)=\frac{\sqrt{x}}{y} \cdot$ (3 points)
7) Let $f(x, y)=\ln \left(3 x+y^{3}\right)+x y^{2}$. (15 points total)
a) Find $f_{x}(x, y)$.
b) Find $f_{y}(x, y)$.
c) Find $f_{y}(1,2)$.
8) Let $f(x, y, z)=y z^{4}-x e^{y}$. (9 points total)
a) Find $f(-2,3,1)$.
b) Find $f_{y}(x, y, z)$.
c) Find $f_{y z}(x, y, z)$.
