MATH 202 **Name:**______________________________

In class work 7 **Row:**_______________________________

"If money can fix it, it's not a problem." Tom (or Ray) Magliozzi

$\boxed{5}$ 1. Find the work done moving a 42 kg mass from $x = -2$ to $x = 5$ if the position dependent force is $F(x) = \begin{cases} x & x < 1 \\ 1 - x & x \geq 1 \end{cases}$, where the units of force are Newtons and the units of distance are meters.

$\boxed{5}$ 2. Find the *numerical value* of $\int_3^8 \frac{1}{8-3x} \mathrm{d}x$.

$\boxed{5}$ 3. Find a general solution to the DE $-y\frac{\mathrm{d}y}{\mathrm{d}x} = x$.

4. Find a formula for each derivative:

$\boxed{5}$ (a) $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(x\mathrm{e}^{1/x^2}\right)$

$\boxed{5}$ (b) $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{\exp(x)-\exp(-x)}{2}\right)$

$\boxed{5}$ (c) $\dfrac{\mathrm{d}}{\mathrm{d}x}(x\mathrm{e}^x)$

(d) $\dfrac{\mathrm{d}}{\mathrm{d}x}\ln\left(\dfrac{1+x}{1-x}\right)$

$\boxed{5}$ 5. Find the numerical value of $\int_1^2 x\mathrm{e}^x+\mathrm{e}^x\,\mathrm{d}x$. **Hint:** Look at your answer to part ‘c’ of the previous question.

6. Let Q be the portion of the xy plane described by $0 \leq x \leq 1$ and $0 \leq y \leq 1 - |x|$.

$\boxed{5}$ (a) Draw a nicely *labeled* picture of the set Q.

$\boxed{5}$ (b) Using *disks* (that is strips *perpendicular* to the axis of rotation), find the *volume* of the solid generated by rotating Q about the x axis. Express the result as a *definite integral*, but **do not** find the numerical value of the definite integral.

$\boxed{5}$ (c) Using *shells* (that is, strips *parallel* to the axis of rotation), find the *volume* of the solid generated by rotating Q about the x axis. Express the result as a *definite integral*, but **do not** find the numerical value of the definite integral.

$\boxed{5}$ (d) Using a strip that is parallel to the y axis, find area of Q.

$\boxed{5}$ (e) Using a strip that is parallel to the y axis, find the y coordinate of the centroid of Q.

$\boxed{5}$ (f) Using a strip that is parallel to the y axis, find the x coordinate of the centroid of Q.

$\boxed{5}$ 7. Express the arclength of the portion of the ellipse $x^2 + 8y^2 = 1$ with $y \le 0$ and endpoints $(x = -1, y = 0)$ and $(x = 1, y = 0)$. Do not attempt to find the numerical value of the definite integral.