MATH 202 **Name:**_____

Practice Exam 1 **Row:**_____

1. On the planet Andoria, the weight W of a sack of potatoes that is x feet from the ground level is $W = \frac{5\times 10^6}{(1000+x)^2}$. Find the work done by lifting the sack of potatoes from $x = 0$ to $x = 1000$.

5 2. Find the work done moving a 107 kg mass from $x = -2$ to $x = 5$ if the position dependent force is $F(x) = \begin{cases} x & x < 1 \\ 1 & x \geq 1 \end{cases}$, where the units of force are Newtons and the units of distance are meters.

5 3. Find the *numerical value* of $\int_3^8 \frac{1}{10-5x}\mathrm{d}x$.

[5] 4. Find a general solution to the DE $y\dfrac{dy}{dx} = x$.

5. Find a formula for each derivative:

[5] (a) $\dfrac{d}{dx}\left(xe^{x^2}\right)$

[5] (b) $\dfrac{d}{dx}\left(\dfrac{\exp(x)+\exp(-x)}{2}\right)$

[5] (c) $\dfrac{d}{dx}\left(x\ln(x)\right)$

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

5 6. Find the numerical value of $\int_1^2 1+\ln(x)\,\mathrm{d}x$. **Hint:** Look at your answer to part 'c' of the previous question.

7. Let Q be the portion of the xy plane described by $0 \le x \le 1$ and $0 \le y \le x(1-x)$.

5 (a) Draw a nicely *labeled* picture of the set Q.

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.

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.

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

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

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

5 8. Express the arclength of the portion of the hyperbola $x^2 - y^2 = 1$ with endpoints $(x = 2, y = \sqrt{3})$ and $(x = 3, y = \sqrt{8})$. Do not attempt to find the numerical value of the definite integral.

5 9. Show that $y^5 = x + c$ is a general solution to the DE $y^4 \frac{dy}{dx} = 1/5$.