Answer the questions in the spaces provided. If you run out of room for an answer, you may continue on the back. Show all of your work. Round answers as appropriate (dollar amounts to the nearest penny, and quantities to whole numbers where logical). Include units when necessary. If you integrate using substitution, clearly show what substitution you made, and what the new integral is.

Name: _____

Do one of the following three problems. **Circle the number of the problem you would like graded.** If the number of circled questions does not equal 1, I will choose one of the three at random to be graded.

1. Approximate the area under the curve $y = 8 - x^3$ from $x = 0$ to $x = 2$ in two ways:
   (a) Using 4 rectangles of equally-sized bases, with right-hand endpoints. You may use the table below to help organize your work.

k	Length of Base	Right-hand Endpoint	Height	Area
1				
2				
3				
4				

(b) Using n rectangles of equally-sized bases, with right-hand endpoints. You may use the table below to help organize your work. Write your answer in sigma notation.

k	Length of Base	Right-hand Endpoint	Height	Area
1				
2				
$\vdots$				
k				
$\vdots$				
n				

2. Find the general solution to the differential equation $(2x^2y + 5xy)dx = (x + 1)dy$

3. Fred calculates that the weekly rate of production from a salt mine is modeled by $\overline{RP}(x) = 500 - 2x$ where production is in thousands of tons of salt, and x is the number of weeks after January 1st. Fred determines that the model is accurate for the first 10 weeks of the year.

   (a) Calculate the accumulated production from week 4 to week 8.

   (b) Fred conjectures that since his model fits the data from the first 10 weeks of the year so well, it will continue to be accurate for the rest of the year. Given that a year lasts 52 weeks, is this a reasonable guess? Explain your reasoning in a short paragraph.