Please show **all** your work! Answers without supporting work will not be given credit.
Write answers in spaces provided.

Name:________________________________

1. **[5 pts]** Write the Left and Right Riemann Sums with 20 rectangles to estimate the area under the curve $\sin(2x+4)-14$ on the interval of $[60,80]$.

Solution:

$$\triangle x = \frac{80-60}{20} = \frac{20}{20} = 1 \quad \textbf{[1 pt]}$$

$$x_i = a + i\cdot\triangle x = 60 + i \quad \textbf{[1 pt]}$$

$$f(x_i) = \sin(2(60+i)+4) - 14 = \sin(124+2i) - 14 \quad \textbf{[1 pt]}$$

Using the above, we find

$$L_n = \sum_{i=0}^{n-1} f(x_i)\cdot\triangle x \quad \Rightarrow \quad \boxed{L_{20} = \sum_{i=0}^{19} \sin(124+2i) - 14} \quad \textbf{[1 pt]}$$

$$R_n = \sum_{i=1}^{n} f(x_i)\cdot\triangle x \quad \Rightarrow \quad \boxed{R_{20} = \sum_{i=1}^{20} \sin(124+2i) - 14} \quad \textbf{[1 pt]}$$

2. **[5 pts]** Write the Left and Right Riemann Sums with 10 rectangles to estimate the area under the curve $3\ln(x^2)$ on the interval of $[0,50]$.

Solution:

$$\triangle x = \frac{50-0}{10} = \frac{50}{10} = 5 \quad \textbf{[1 pt]}$$

$$x_i = a + i\cdot\triangle x = 5i \quad \textbf{[1 pt]}$$

$$f(x_i) = 3\ln\left((5i)^2\right) = 3\ln(25i^2) \quad \textbf{[1 pt]}$$

Using the above, we find

$$L_n = \sum_{i=0}^{n-1} f(x_i)\cdot\triangle x \quad \Rightarrow \quad \boxed{L_{20} = \sum_{i=0}^{19} 3\ln(25i^2)} \quad \textbf{[1 pt]}$$

$$R_n = \sum_{i=1}^{n} f(x_i)\cdot\triangle x \quad \Rightarrow \quad \boxed{R_{20} = \sum_{i=1}^{20} 3\ln(25i^2)} \quad \textbf{[1 pt]}$$