Homework 2 - Math 142   **Name:** _____

Bring your solutions to these problems to class on Friday. You can use them during the quiz.

1. Approximate the area under the curve $y = \dfrac{1}{x}$ from $x = 1$ to $x = 4$ using a Riemann sum with 100 rectangles. Give both the numerical result and the summation formula that you used to calculate the sum (I recommend using Desmos for this problem).

2. Approximate the area under the curve $f(x) = \sin(\sqrt{x})$ from $x = 0$ to $x = \pi^2$ using a Riemann sum with 1000 rectangles. Give both the numerical result and the summation formula that you used to calculate the sum.

3. Find $\dfrac{d}{dx} \ln(\ln x)$.

4. Find $\dfrac{d}{dx} \ln\left(\dfrac{x^3\sqrt{x+5}}{5^x}\right)$. Hint: Use the logarithm properties to simplify before differentiating.

5. Use logarithmic differentiation to find $\dfrac{d}{dx} x^{-4x}$.

6. Find $\displaystyle\int \dfrac{\cos\theta}{1+\sin\theta}\, d\theta$.

7. Find $\displaystyle\int \dfrac{\cos\theta}{(1+\sin\theta)^2}\, d\theta$.

8. Find $\displaystyle\int_1^7 \dfrac{1}{x+2}\, dx$.

9. Find $\displaystyle\int_1^e \dfrac{(\ln x)^2}{x}\, dx$.