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

Due by 5:00pm Friday, September 4. Send a PDF with your solutions to `blins@hsc.edu`.

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).

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

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

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

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5. Find $\displaystyle\int \frac{\cos\theta}{1+\sin\theta}\, d\theta$.

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6. Find $\int_1^7 \frac{1}{x+2}\,dx$.

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7. Find $\int_1^e \frac{(\ln x)^2}{x}\,dx$.

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8. Compute the following without a computer:

   (a) $\log_2(12) + \log_2(\frac{2}{3})$

   (b) $\log_5(100) - \log_5(4)$

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9. Solve the following equations for x.

   (a) $\log_{10}(x) + \log_{10}(x) = 8$

   (b) $\log_x(10) = 2$

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10. Find these logarithms without a computer:

    (a) $\log_2(8\sqrt{8})$

    (b) $\log_{10}\left(\frac{1}{\sqrt{1{,}000{,}000}}\right)$
