## More on Improper Integrals

1. Consider $\int_1^\infty \frac{1}{x^p}\,dx$.
   For what values of $p$ does this improper integral converge? Explain.

2. Consider $\int_0^1 \frac{1}{\sqrt{x}}\,dx$. Investigate...

## Misc Questions

3. A Riemann Sum
   (a) Evaluate: $\lim_{n\to\infty} \sum_{k=0}^{n-1} 2\left(1+\frac{3k}{n}\right)^2 \frac{3}{n}$
   (b) Is this a *left box* or *right box* Riemann sum? Explain.

4. Consider $A(x) = \int_1^x \ln(t)\,dt$ where $x \geq 1$. On a graph board, draw $y = \ln(t)$ in the first quadrant. Use the graph and an very easy antiderivative to rewrite $A(x)$ without an integral.

5. Assume $x$ and $y$ are generated at random from the open interval $(0,1)$. Determine the probability that $0.1 < xy < 0.2$.

6. Show how to find $S_n = \sum_{i=0}^{n} ar^i$. Under what conditions will the sequence $\{S_n\}$ converge as $n \to \infty$?

7. Express $.24\overline{68}$ as a proper fraction. Be sure to explain how you get your answer.

8. Demonstrate how to use a $\theta$-substitution (e.g. $x = \sin(\theta)$) to evaluate $\int_0^1 \frac{1}{\sqrt{1-x^2}}\,dx$.