

## Improper Integrals

Converge? How do you know? To what?

Diverge? How do you know?

### From Yesterday

1.  $\int_1^{\infty} \frac{1}{\sqrt{x}} dx$

2.  $\int_1^{\infty} \frac{1}{1+x^2} dx$

3.  $\int_1^{\infty} \frac{1}{3+x^2} dx$

(Demonstrate how to get anti-derivative for this one.)

4.  $\int_0^{\infty} xe^{-x^2} dx$

5.  $\int_0^{\infty} e^{-x^2} dx$

### New Questions

6. Consider  $\int_1^{\infty} \frac{1}{x^p} dx$ .

For what values of  $p$  does this improper integral converge? Explain.

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

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

9. Show how to find  $S_n = \sum_{k=0}^n ar^k$ .

10. Demonstrate how to use a  $\theta$ -substitution to evaluate  $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$ .

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