

# MTH 252Z Lab

## Improper Integrals

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### Prompts

1. How can we rewrite  $\int_a^\infty f(x) dx$  using a limit?
2. If  $f(x)$  has a vertical asymptote at  $x = 2$ , how can we rewrite  $\int_0^2 f(x) dx$  using a limit? (Don't forget to include a left- or right-handed limit if necessary)
3. If  $f(x)$  has a vertical asymptote at  $x = 2$ , how can we rewrite  $\int_0^3 f(x) dx$  using a limit?
4. Determine if  $\int_1^\infty e^{-x} dx$  converges or diverges. If it converges, find what it converges to. Show all work, and use proper notation as you work through.
5. Determine if  $\int_1^\infty \frac{2}{x^5} dx$  converges or diverges. If it converges, find what it converges to. Show all work, and use proper notation as you work through.
6. Determine if  $\int_0^1 \frac{2}{x^5} dx$  converges or diverges. If it converges, find what it converges to. Show all work, and use proper notation as you work through.
7. Determine if  $\int_3^\infty \frac{1}{x \ln x} dx$  converges or diverges. If it converges, find what it converges to. Show all work, and use proper notation as you work through.
8. Determine if  $\int_1^\infty \frac{1}{1+x^2} dx$  converges or diverges. If it converges, find what it converges to. Show all work, and use proper notation as you work through.
9. Determine if  $\int_0^6 \frac{2}{(x-1)^3} dx$  converges or diverges. If it converges, find what it converges to. Show all work, and use proper notation as you work through.