# Problem Set 8 

2019 Math Boot Camp for the Political and Social Sciences

## Deeper Thinking

1. We saw that we have the method of substitution to serve as a "reverse" to the Chain rule. Is there a reverse to the Product rule?
2. Compute $\int \log (x) d x$.
3. If one takes 3 random points on a circle and connects them to make a triangle, what is the probability that the center of the circle is contained inside the triangle?

## Some practice

1. Compute the following integrals:
(a) $\int_{0}^{3} e^{x} d x$
(b) $\int 4 \cos (x) d x$
(c) $\int \frac{1}{x}-\sin (x) d x$
2. After making the provided substitution, compute the following integrals, then convert back to the original variable:
(a) $\int \frac{1}{1-x} d x$ with $u=1-x$.
(b) $\int 2 x \cos \left(x^{2}+1\right) d x$ with $u=x^{2}+1$.
(c) $\int \frac{1}{x \log (x)^{5}} d x$ with $u=\log (x)$.
3. The well-known Advanced Calculus political party is very popular, but we will follow their dwindling success in terms of number of months $t$. At the beginning of February, which we call $t=1$, they have an approval rating of $80 \%$. The rate of change of their approval percentage over $t$ months is given by $f(t)=\frac{-20}{t}$. What will their approval rating be by the end of the year?
4. Read the exercises from Chapter 7 in [Moore-Siegel] and either do them or thoroughly convince yourself they're not worth your time.
