

Math 1B Worksheet 1

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- $\frac{d}{dx} \int_1^x te^t dt$
- $\frac{d}{dx} \int_1^{\cos x} te^t dt$
- $\frac{d}{dx} \int_{\tan x}^{x^2} \frac{1}{\sqrt{2+t^4}} dt$
- $\int \frac{dx}{\sqrt{x}\sqrt{5-\sqrt{x}}}$
- $\int \frac{e^{1/x}}{x^2} dx$
- $\int \frac{3+2\ln x}{6x} dx$
- $\int x^2 \sin 5x dx$
- $\int e^x \cos 2x dx$
- $\int \frac{\ln x}{x^2} dx$
- $\int x^5 e^{x^2} dx$
- $\int \ln x dx$
- $\int \cos(\ln x) dx$
- Show that for any n ,
$$\int (\ln x)^n dx = x(\ln x)^n - n \int (\ln x)^{n-1} dx$$
- $\int \cos x \ln(\sin x) dx$
- Show that for any function f , $\int f e^x dx = f e^x - \int f' e^x dx$.
[Hint: Can you express $(f e^x)$ in terms of $(f e^x)'$ and $f' e^x$? How can you apply FTC?]
- Can we generalize the result of the previous exercise for $f e^{kx}$ for any constant k ?
- Show that if f is a polynomial of degree $= n$, then
$$\int f e^x dx = (f - f' + f'' - f''' \dots + (-1)^n f^{(n)}) e^x$$