# Math 241: HW 15

Due on Friday, November 8

*Fall '13*

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# Problem 1

Compute the following:

$$\frac{d}{dx}\int_3^{x^2} \frac{t^2+3}{t^8+3}dt$$

$$\frac{d}{dx}\int_{\sin(x)}^{x^2} \frac{t^4+2}{t^4+3}dt$$

# Problem 2

Compute the following:

$$\int_1^3 x^2+2x+7dx$$

$$\int_{-3}^7 x(x+4)dx$$

# Problem 3

Compute the following:

$$\int_4^9 \frac{(\sqrt{x}+5)^{10}}{\sqrt{x}}dx$$

$$\int_{\sqrt[4]{2}}^{\sqrt[4]{3}} (x^4-2)^{15}x^3dx$$

$$\int_4^5 \frac{x-2}{(x-3)^{10}}dx$$

# Problem 4

Our ultimate goal is to compute the area under $\frac{1}{\sqrt{x}}$ on the interval $[0,1]$. We can't just set up the integral $\int_0^1 \frac{1}{\sqrt{x}}$ because 0 is not in the domain of $\frac{1}{\sqrt{x}}$. However, we may proceed in the following way:

a) Let $g(a)=\int_a^1 \frac{1}{\sqrt{x}}$ for some $a>0$, and compute $\int_a^1 \frac{1}{\sqrt{x}}$.

b) Take your result from part $a$) and compute

$$\lim_{a\to 0^+} g(a).$$

# Problem 5

Find the area between $f(x) = x^3$ and $g(x) = x$ on the interval $[-3, 3]$. To do this, you should end up computing 4 different definite integrals.