

**Math 266B****Guide for Test 1**

Here are some sample questions from old tests. Some topics that we covered are not represented by these questions, but are still fair game.

1. Find the function  $f$  for  $x > 0$  that has  $f''(x) = x^{-2}$ ,  $f(1) = 0$ , and  $f(2) = 0$ .
2. Based on the definition of the definite integral, approximate

$$\int_1^3 \sin((x+2)^3) dx$$

using  $n = 4$  rectangles.

3. If  $\int_1^5 f(x)dx = 12$  and  $\int_4^5 f(x)dx = 3.6$ , what is  $\int_1^4 f(x)dx$ ?

4. If  $f(1) = 3$  and  $f'(x) \geq 0$  for all  $x$ , what is the smallest that  $\int_1^5 f(x)dx$  can be?  
What is the largest it can be?

5. Compute

- (a)  $\int (e^x + x^{-3} + x^{1/3} + 3x^{-1}) dx$

- (b)  $\int_1^3 \sin(3)dx =$

- (c)  $\int_0^\pi \sin(x)dx =$

- (d)  $\int_5^5 \arctan(x)dx =$

- (e)  $\int \frac{x^2 - 3}{x} dx =$

- (f)  $\int \left( 3 \csc^2(x) - \frac{5}{1+x^2} \right) dx$

- (g)  $\frac{d}{dx} \int_9^x \frac{\tan(t)}{\sqrt{t}} dt =$

- (h)  $\frac{d}{dx} \int_4^2 \frac{\sqrt{t+1}}{\ln t} dt =$

6. (a) Compute the area of the region enclosed by the curves  $y = (x-1)^2$  and  $y = x+1$ .  
(b) Compute the volume obtained by rotating this region about the  $x$ -axis.