

Mth 31, Homework 13 on sections 5.4, 5.5

Extra Credit

Due by Mon, Dec 9.

Try these questions. Each is worth 3 points.

Section 5.4 Indefinite integrals and the net change theorem

(1) Calculate the indefinite integral: $\int (12x^5 + 1) dx$

(This is another way of asking for the general antiderivative.)

(2) Find: $\int (\sin t - \sinh t) dt$

(3) Find: $\int (3u + 2)(u + 4) du$

(4) Compute the following definite integral by first finding the indefinite integral and then using Part 2 of the fundamental theorem:

$$\int_1^3 \frac{2x^2 + 4x - 1}{x} dx$$

(5) Compute the definite integral: $\int_0^{\pi/4} \frac{1 + \cos^2 \theta}{\cos^2 \theta} d\theta$

(6) An object moves in a straight line with position $s(t)$ cm and velocity $v(t)$ cm/s at time t . Suppose the object's acceleration is $a(t) = 2t - 1$ and $v(0) = -12$.

(a) Explain what $v(0) = -12$ means here in your own words.

(b) Find $v(t)$

(c) What is the displacement of the object between $t = 0$ and $t = 6$ seconds? (In other words, what is the net change of its position?)

(d) What is the total distance traveled by the object between $t = 0$ and $t = 6$ seconds?

Section 5.5 The substitution rule

(7) Find the indefinite integral $\int \cos(10x) dx$ by using the substitution $u = 10x$.

(8) Find the indefinite integral $\int \tan^2(\theta) \sec^2(\theta) d\theta$ by using $u = \tan(\theta)$.

(9) Use the substitution rule to find: $\int \frac{\cos(\sqrt{t})}{\sqrt{t}} dt$

Differentiate your answer and check you get $\frac{\cos(\sqrt{t})}{\sqrt{t}}$.

(10) Find: $\int \frac{e^x}{e^x + \pi} dx$

(11) Evaluate: $\int 2x^3 \sqrt{x^2 + 3} dx$

(12) Compute the definite integral: $\int_{\sqrt{\pi}}^{\sqrt{2\pi}} 8x \sin(x^2) dx$

(13) Compute: $\int_{2/3}^1 (3y - 2)^{1000} dy$

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.
- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).
- Ask me about it after class.
- Come to my office hours: Mon 12:00 - 1:00, Wed 12:00 - 1:00 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.