

Math 1231: Single-Variable Calculus 1
George Washington University Spring 2023
Recitation 13

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Problem 1. Compute the following integrals:

(a) $\int \sqrt{3x - 4} \, dx.$

(b) $\int \frac{\sin(\sqrt{x})}{\sqrt{x}} \, dx.$

(c) $\int x\sqrt{x+1} \, dx.$

Problem 2. (a) Compute $\int_1^2 \frac{6x^2 - 7}{\sqrt{2x^3 - 7x + 14}} \, dx$ using a u -substitution and explicitly changing the bounds of integration.

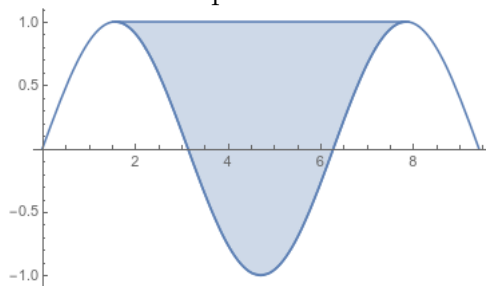
(b) Now compute the indefinite integral $\int \frac{6x^2 - 7}{\sqrt{2x^3 - 7x + 14}} \, dx.$

(c) Use your answer in part (b) to compute $\int_1^2 \frac{6x^2 - 7}{\sqrt{2x^3 - 7x + 14}} \, dx$ again. How does this compare to what you did in part (a)?

Problem 3. We want to compute $\int \sec^8(x) \tan(x) \, dx.$ Can you find multiple u that all work?

Problem 4. Evaluate $\int_{-2}^2 4\sqrt{4 - x^2} \, dx$ by thinking about area. (Hint: what does the graph of $\sqrt{4 - x^2}$ look like?)

Problem 5. Compute the total area of the “valley” between two peaks of the sine function.



Problem 6. We want to find the area of the region bounded by $y = x^2 + 1$, $y = 17 - x^2$, and $x = 1$, taking the side with $x \geq 1$.

- Sketch the region in question. Based on the picture, would you rather integrate with respect to x or to y ? Discuss this with someone near you.
- Set up an integral to compute this region, integrating with respect to x .
- Set up an integral to compute this region, integrating with respect to y .
- Which of these integrals do you prefer? Pick one and compute it.