

## Homework #13

Due Friday, March 15th in Gradescope by 11:59 pm ET

**Goal:** Computing Definite Integrals using the FTC and also  $u$ -substitution.

1. Compute  $\int_{-2}^3 3 - 4x - x^2 dx$  using Two different methods.

- (a) Fundamental Theorem of Calculus  
 (b) Limit Definition of the Definite Integral.

Compute the following Indefinite Integrals. Simplify.

$$\begin{array}{lll}
 2. \int x^2 (1 - x^3)^7 dx & 3. \int \frac{x^4}{(x^5 - 3)^8} dx & 4. \int \sec(3x) \tan(3x) dx \\
 5. \int x^2 \cos(x^3 - 6) dx & 6. \int \frac{\sec^2\left(\frac{1}{x}\right)}{x^2} dx & 7. \int \cos^4 x \cdot \sin x dx \\
 8. \int x\sqrt{4 - x^2} dx & 9. \int \frac{x}{\sqrt{4 - x^2}} dx & 10. \int \frac{\sin\sqrt{x}}{\sqrt{x}} dx \\
 11. \int \frac{\cos x}{\sin^2 x} dx & 12. \int \sqrt{x} \cdot \cos\left(9 + x^{\frac{3}{2}}\right) dx & 13. \int \frac{\cos x + \sin x}{(\cos x - \sin x)^3} dx
 \end{array}$$

Compute the following Definite Integrals. Simplify. Remember to *mark OR change your limits*

$$14. \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cos(4x) dx \quad 15. \int_{2\pi}^{6\pi} \sin\left(\frac{x}{6}\right) dx \quad 16. \int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \frac{\sec^2 x}{\tan^3 x} dx$$

17. If  $w'(t)$  is the rate of growth of a child in pounds per year, what does  $\int_5^{10} w'(t) dt$  represent?

18. Consider velocity for a particle moving on a line given by  $v(t) = 3t - 6$  meters per second.

- Compute both (a) the Displacement and (b) the Total Distance traveled by the particle when  $0 \leq t \leq 3$ .
- Sketch both  $v(t)$  and  $|v(t)|$ .

The second sketch  $|v(t)|$  will help you figure out the Absolute Value cases for the Total Distance formula.

# REGULAR OFFICE HOURS

**Monday: 12:00–3:00 pm**

**Tuesday: 1:00–4:00 pm**

7:30–9:00 pm TA Alexa, SMUDD **208A**

**Wednesday: 1:00-3:00 pm**

**Thursday: none for Professor**

6:00–7:30 pm TA Alexa, SMUDD **208A**

**Friday: 12:00–2:00 pm**

- Check that you substitute all pieces. Check constants carefully.
- Definite Integral is a value. Indefinite Integral is a collection of functions.
- Grab an extra hour a day to study. Happy Spring Break!