

Worksheet 6, Tuesday, March 21st, 2023

Compute each of the following Indefinite Integrals using u -substitution: Remember $+C$ each time.

$$1. \int x^7 (4 - x^8)^6 dx \quad 2. \int \frac{\cos \sqrt{x}}{\sqrt{x}} dx \quad 3. \int (\cos x) \sin^6 x dx$$

$$4. \int x^5 \sqrt{x^6 + 7} dx \quad 5. \int \frac{x}{(x^2 + 1)^9} dx \quad 6. \int \frac{\sin x}{\cos^5 x} dx$$

$$7. \int \sec^2 x \cdot \tan^5 x dx \quad 8. \int \frac{\left(9 + \frac{1}{x}\right)^3}{x^2} dx$$

$$9. \int_1^4 \frac{1}{\sqrt{x} (1 + \sqrt{x})^3} dx \quad \text{Note: Definite Integral for } u\text{-substitution. } \mathbf{Change\ your\ limits.}$$

10. Find a function $f(x)$ that satisfies $f'(x) = x^2 \sin(x^3)$ and $f(0) = 3$

11. Consider an object travelling with velocity given by $v(t) = t - 4$ feet per second.

(a) Graph $v(t)$.

(b) Graph $|v(t)|$.

(c) Write out the definition of $|v(t)|$.

(d) Compute the **Displacement** for this object from time $t = 1$ to $t = 5$.

(e) Compute the **Total Distance** for this object from time $t = 1$ to $t = 5$.

For (d) and (e), think about the Area Interpretations to see if those values make sense...

Use the Fundamental Theorem of Calculus Part I for the following:

$$13. \text{ Compute } f'(x) \text{ where } f(x) = \int_5^x \frac{1}{t+7} dt.$$

$$14. \text{ Compute } f'(x) \text{ where } f(x) = \int_x^9 \sqrt{t^2 + 3} dt.$$

$$15. \text{ Compute } g''(x) \text{ where } g(x) = \int_x^7 \sqrt{1 + \cos t} dt.$$

Turn in your own solutions.
