

Worksheet 6, Tuesday, March 10th, 2026

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

1. $\int x^7 (4 - x^8)^6 dx$ 2. $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$ 3. $\int (\cos x) \sin^6 x dx$ 4. $\int x^5 \sqrt{x^6 + 7} dx$
5. $\int \frac{x}{(x^2 + 1)^9} dx$ 6. $\int \frac{\sin x}{\cos^5 x} dx$ 7. $\int \sec^2 x \cdot \tan^5 x dx$ 8. $\int \frac{\left(9 + \frac{1}{x}\right)^3}{x^2} dx$
9. $\int_1^4 \frac{1}{\sqrt{x} (1 + \sqrt{x})^3} dx$ Note: Definite Integral for u -substitution. **Change your limits.**
10. Find a function $f(x)$ that satisfies $f'(x) = x^2 \sin(x^3)$ and $f(0) = 3$
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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 $|v(t)| = |t - 4|$.
- (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:

12. Compute $f'(x)$ where $f(x) = \int_5^x \frac{1}{t+7} dt$.
13. Compute $f'(x)$ where $f(x) = \int_x^9 \sqrt{t^2 + 3} dt$.
14. Compute $g''(x)$ where $g(x) = \int_x^7 \sqrt{1 + \cos t} dt$.

Turn in your own solutions into Gradescope before 11:59 pm today, Tuesday March 10

Finish all problems through number 10