MAT1575, Spring 2023 **Homework - Integration by Substitution**
Instructor: Suman Ganguli **Due: Wednesday, Oct 4** **Name:** _____

For each of the following:

- write down "an appropriate" substitution u (for some of the exercises, u is given–use those exercises to understand why that choice of u works)
- find du by differentiating u
- make the substitution into the given integral to transform it into an integral in the new variable u
- find the general antiderivative with respect to u
- resubstitute to to get the antiderivative to the original integral in the original variable

1. $\int (x-7)^3\,dx =$

   $u = x - 7$

   $du =$

2. $\int \cos(\theta + \pi)\,d\theta =$

   $u =$

   $du =$

3. $\int 2t\sqrt{t^2+1}\,dt =$

   $u = t^2 + 1$

   $du =$

4. $\int \dfrac{(\ln x)^2}{x}\,dx =$

   $u = \ln x$

   $du =$

5. $\int \sin^2\theta \cos\theta\,d\theta =$

   $u = \sin\theta$

   $du =$

6. $\int (4x+5)^9\,dx$

$u = 4x+5$

$du = 4\,dx \Longrightarrow dx = \dfrac{1}{4}du$

7. $\int \cos(5x)\,dx$

$u =$

$du =$

8. $\int xe^{x^2}\,dx$

$u = x^2$

$du =$

9. $\int \dfrac{dz}{(5-2z)^2}$

$u =$

$du =$

10. $\int \dfrac{x^2}{x^3+1}\,dx$

$u =$

$du =$