

Math 3B — Week 2

**Integration by  $u$ -substitution** Evaluate each of the following integrals.

(a)  $\int x^2 \tan(x^3) dx$

(e)  $\int \frac{2 \sin(x)}{1 + \cos(x)} dx$

(b)  $\int (x^2 + x^3)^2 (2x + 3x^2) dx$

(f)  $\int \sin^3(x) \cos(x) dx$

(c)  $\int x e^{x^2} dx$

(g)  $\int \sin^4(7x) \cos(7x) dx$

(d)  $\int \frac{\sin(\ln(x))}{x} dx$

(h)  $\int \left( \int_0^y x^2 \sqrt{1+x^3} dx \right)^7 y^2 \sqrt{1+y^3} dy$   
(Hint: FTC!)

If I find some time, I may write actual solutions for this. For now, here are some substitution suggestions.

(a) Let  $u = x^3$ .

(b) Let  $u = x^2 + x^3$ .

(c) Let  $u = x^2$ .

(d) Let  $u = \ln(x)$ .

(e) Let  $u = 1 + \cos(x)$ .

(f) Let  $u = \sin(x)$  or  $u = \sin^2(x)$ .

(g) Let  $u = 7x$  and  $v = \sin(u)$ .

(h) Let  $u = \int_0^y x^2 \sqrt{1+x^3} dx$ .



**Definite Integrals with  $u$ -substitutions** Redo the last page as definite integrals using both methods of computing definite integrals that require  $u$ -substitutions.

