

MAT 137
Tutorial #12– Integration methods I
July 15–16, 2019

1. Warm up! Evaluate the following integrals.

(a) $\int e^{-5x+1} dx$. *Hint:* Try the substitution $u = -5x + 1$.

(b) $\int x^2 \sqrt{x^3 + 1} dx$. *Hint:* Try a substitution.

(c) $\int_0^{\pi/4} \frac{\sin \theta}{\cos^3 \theta} d\theta$. *Hint:* Try a substitution.

(d) $\int_1^2 \sqrt{x-1} (x+1) dx$. *Hint:* Try the substitution $u = x - 1$.

(e) $\int x \sin(3x) dx$. *Hint:* Try integration by parts with $u = x$ and $dv = \sin(3x) dx$.

(f) $\int_1^2 x^3 \ln x dx$. *Hint:* Try integration by parts.

2. Evaluate the following integrals. You may find it useful to try substitution, or integration by parts, or ingenuity, or all of them.

(a) $\int x^7 e^x dx$

(f) $\int \frac{\sin x - \cos x}{\sin x + \cos x} dx$

(b) $\int e^{ax} \sin(bx) dx$

(g) $\int \frac{\cos \sqrt{t}}{\sqrt{t}} dt$

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

(h) $\int \cos \sqrt{t} dt$

(d) $\int x^3 \sqrt{x^2+1} dx$

(i) $\int x^2 \arcsin x^3 dx$

(e) $\int_{1/4}^{1/2} \frac{1}{x \ln x} dx$

(j) $\int x \arctan x dx$