MAT 137
Tutorial #13– Integration methods I
February 6–7, 2017

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

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

   (e) $\int x\sin(3x)\, dx.$ *Hint:* Try integration by parts.

   (f) $\displaystyle\int_1^2 x^3 \ln x\, dx.$ *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) $\int x^7 e^x\, dx$

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

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

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

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

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

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

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

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

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