(7.1) Integration by Parts

Full Name: ____

1. Use integration by parts to evaluate each of the following indefinite integrals.

   (a) Note that the function inside our integral is of the form of a polynomial times either e^{kx}, $\cos(kx)$, or $\sin(kx)$. As such, we have an integral that is able to yield $F(x)$ via IBP. If we set u equal to the polynomial and dv equal to everything else expressed inside the integral, we will (eventually) yield solution (having to apply IBP at most as many times as the degree of the polynomial).

   (b) Similar to (a).

   (c) Similar to (a). Note that two applications of IBP will be needed (since our polynomial is of degree two).

   (d) Similar to (a). Note that three applications of IBP will be needed (since our polynomial is of degree three).

   (e) Note that the function within our integral includes a factor of $\ln(\cdots)$ and there is no factor of $\frac{1}{x}$ to accommodate a u-substitution. As such, we will have to apply IBP, letting u equal the factor of $\ln(\cdots)$.

   (f) Similar to (e).

   (g) Note that the function within our integral includes a factor related to an inverse-trig function. This is a tell-tale sign that IBP will be needed. In particular, we will need to let u be equal to the inverse-trig factor within our function.

   (h) Note than the function within our integral is a product of a factor of e^{kx} and a factor of either $\sin(kx)$ or $\cos(kx)$. As such, we can use IBP. In this (special) case, we will need to apply IBP twice and use algebra to solve for the value of our original integral of interest (as the expression for it will reappear upon the second application of IBP).