Homework 2: Integration by Parts (due January 23)

1. Compute $\int x\big(\ln(x)\big)^4\,dx$

2. Compute $\displaystyle\int_0^1 t\arcsin(t^2)\,dt$

3. Use integration by parts twice to find $\int e^x\sin(x)\,dx$

4. Estimate $\displaystyle\int_0^{10} f(x)g'(x)\,dx$ given that $f(x)=x^2$ and $g(x)$ has the table

x	0	2	4	6	8	10
$g(x)$	2.3	3.1	4.1	5.5	5.9	6.1

5. Let $F(a)$ be the area under the graph of $y=x^2e^{-x}$ between $x=0$ and $x=a$, where $a>0$.

(a) Find a formula for $F(a)$

(b) If $F(a)$ an increasing or a decreasing function?

(c) Is $F(a)$ concave up or concave down on the interval $0<a<2$?