Quiz 4 Key
Math 1220–7
September 21, 2012

Directions: Show all work for full credit. Clearly indicate all answers. Simplify all mathematical expressions completely. No calculators are allowed on this quiz. Each part of each question is worth 15 points.

Formula:

$$\int u(x)\mathrm{v}'(x)\,dx = u(x)\mathrm{v}(x) - \int \mathrm{v}(x)u'(x)\,dx$$

1. Find $D_x[\ln(\sinh x)]$ (#19 from 6.9)

$$D_x[\ln(\sinh x)] = \frac{1}{\sinh x}\cosh x = \coth x$$

2. Find $\displaystyle\int x\cosh(\pi x^2+5)\,dx$ (#39 from 6.9)

$$\int x\cosh(\pi x^2+5)\,dx = \frac{1}{2\pi}\sinh(\pi x^2+5) + C$$

3. Use integration by parts to evaluate each of the following:

(a) $\int x \cos x \, dx$ (#5 from 7.2)

$$\begin{aligned}\int x \cos x \, dx &= x \sin x - \int \sin x \, dx \\ &= x \sin x + \cos x + C\end{aligned}$$

(b) $\int x^2 e^x \, dx$ (#37 from 7.2)

$$\begin{aligned}\int x^2 e^x \, dx &= x^2 e^x - \int 2x e^x \, dx \\ &= x^2 e^x - 2x e^x + \int 2e^x \, dx \\ &= x^2 e^x - 2x e^x + 2e^x + C\end{aligned}$$