Math 21J **Quiz 9** **November 6, 2007** **Name:** Key

1. Use integration to find (a) the area under $f(x) = x^4$ from $x = 1$ to $x = 3$; (b) the area under $f(x) = \sin x$ from $x = 0$ to $x = \pi / 2$.

(a) $\int_1^3 x^4\,dx = \left.\frac{x^5}{5}\right|_1^3 = \frac{3^5}{5} - \frac{1^5}{5} = \boxed{\frac{242}{5}}$

(b) $\int_0^{\pi/2} \sin x\,dx = -\cos x\Big|_0^{\pi/2} = -\cos\frac{\pi}{2} - (-\cos 0) = \boxed{1}$

2. Note that $\frac{d}{dx}(-x\cos x + \sin x) = x\sin x$. Evaluate $\int_0^{\pi} x\sin x\,dx$.

$\angle = -x\cos x + \sin x\Big|_0^{\pi}$

$= -\pi \underbrace{\cos\pi}_{-1} + \underbrace{\sin\pi}_{0} - (-0 + 0)$

$= \boxed{\pi}$

3. Evaluate:

(a) $\int_0^2 (3x^2 + 5x)dx$

$= x^3 + \frac{5}{2}x^2\Big|_0^2$

$= 8 + \frac{5}{2}\cdot 4 = \boxed{18}$

(b) $\int_0^{\ln 3} 4e^{2x}dx = 2e^{2x}\Big|_0^{\ln 3}$

$= 2e^{2\ln 3} - 2e^0$

$= 2e^{\ln 3^2} - 2$

$= 2\cdot 3^2 - 2 = \boxed{16}$