Calculus I/Exam #2B/April 13, 2009

SOLUTIONS

1. (a) $D_x \ln(x^2+3) = \dfrac{2x}{x^2+3}$
   (b) $D_x e^{x^2+3} = 2xe^{x^2+3}$
   (c) $D_x x^4 e^x = (x^4+4x^3)e^x$
   (d) $D_x 3^x = 3^x \ln 3$
   (e) $D_x e^x \cos x = e^x(\cos x - \sin x)$
   (f) $D_x \ln(\sin x) = \dfrac{\cos x}{\sin x} = \cot x$
   (g) $D_x \ln e^x = 1$

2. (a) $\displaystyle\int x^2+2x+3\,dx = \tfrac{1}{3}x^3 + x^2 + 3x + C$
   (b) $\displaystyle\int 2\sqrt{x}\,dx = \tfrac{4}{3}x^{3/2} + C$
   (c) $\displaystyle\int \cos x\,dx = \sin x + C$
   (d) $\displaystyle\int \frac{3x^2}{x^3+1}\,dx = \ln(x^3+1) + C$
   (e) $\displaystyle\int e^{3x+1}\,dx = \tfrac{1}{3}e^{3x+1} + C$

3. (a) $\displaystyle\int_{-1}^{1} x^3\,dx = \left[\tfrac{1}{4}x^4\right]_{-1}^{1} = 0$
   (b) $\displaystyle\int_3^4 \frac{1}{x}\,dx = [\ln x]_3^4 = \ln\tfrac{4}{3}$
   (c) $\displaystyle\int_1^3 \frac{1}{x^2}\,dx = \left[-\frac{1}{x}\right]_1^3 = \tfrac{2}{3}$
   (d) $\displaystyle\int_0^{\pi/2} \sin x\,dx = [-\cos x]_0^{\pi/2} = 1$
   (e) $\displaystyle\int_0^1 x^3(x^4+1)^3\,dx = \left[\tfrac{1}{16}(x^4+1)^4\right]_0^1 = \tfrac{15}{16}$

4. $12e^{-\frac{5}{2}\ln 2} \simeq 2.12\text{g}$

5. $\frac{1}{10}\ln(3.1/3) \simeq 0.0033$

6. $\frac{73}{45} \simeq 1.62222$

7. $p_1 = 2.66667$, $p_2 = 2.64583$.