Calculus Assignment 7

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1 Solve the following integrals using integration by parts:

$$\int_0^1 te^{2t}dt = [\frac{t^2e^{2t}}{2} - \frac{1}{2}\int e^{2t}dt]_0^1 = \frac{1e^2}{2} - \frac{e^2}{4} + C - \frac{0e^0}{2} + \frac{e^0}{4} + C = \frac{e^2+1}{4}$$

$$\int_{-1}^1 t^2e^t dt = [t^2e^t - \int 2te^t dt]_0^1 = [t^2e^t - 2te^t + 2e^t]_0^1 =$$
$$= e - 2e + 2e + C - (\frac{1}{e} + \frac{2}{e} + \frac{2}{e} + C) = \frac{e^2-5}{e}$$

$$\int_0^\pi tcos(t)dt = [tsin(t) - \int sin(t)dt]_0^1 =$$
$$= \pi sin(\pi) + cos(\pi) + C - 0sin(0) - cos(0) - C = -1 - 1 = -2 \tag{1}$$

2 Compute the following integral using integration by parts:

$$\int_1^2 ln(t)dt = \int_1^2 1 * ln(t)dt = [tln(t) - \int \frac{t}{t}dt]_1^2 = \tag{2}$$
$$= 2ln(2) - 2 + C - ln(1) + 1 - C = 2ln(2) - 1$$

3 Solve the following integrals using integration by parts:

$$\int_0^1 te^{\frac{t^2}{2}}dt = \int_0^{\frac{1}{2}} e^{\frac{t^2}{2}}d(\frac{t^2}{2}) = \left[e^{\frac{t^2}{2}} + C\right]_0^1 = e^{\frac{1}{2}} - 1$$

$$\int_0^{\frac{\pi}{2}} e^{cost(t)}sin(t)dt = \int_0^{\frac{\pi}{2}} -e^{cost(t)}(-sin(t))dt = \int_0^{\frac{\pi}{2}} -e^{cost(t)}d(cos(t)) = \tag{3}$$
$$= \left[-e^{cos(t)}\right]_0^{\frac{\pi}{2}} = -1 + C + e - C = e - 1$$