Tarea 10

1) $\int_1^2 (6x^2+6x-6)\,dx$

$\int (6x^2+6x-6)\,dx = \frac{6x^3}{3} + \frac{6x^2}{2} - 6x + C = 2x^3+3x^2-6x+C$

$\int_1^2 (6x^2+6x-6)\,dx = 2x^3+3x^2-6x\Big|_1^2 = 2(2)^3+3(2)^2-6(2)$

$-[2(1)^3+3(1)^2-6(1)] = 16+12-12-2-3+6$

$= \boxed{17}$

2) $\int_2^1 (6x^2+6x-6)\,dx = -\int_1^2 (6x^2+6x-6)\,dx = \boxed{-17}$

3) $\int_{-11}^{-9} (10-x)(10+x)^3\,dx$

$(10-x)(10+x) = 100-x^2$

$(100-x^2)(100+20x+x^2) = 10000+2000x+100x^2$
$-100x^2-20x^3-x^4$

$= -x^4-20x^3+2000x+10000$

$\int_{-11}^{-9} (-x^4-20x^3+2000x+10000)\,dx = \frac{-x^5}{5} - \frac{20x^4}{4} + \frac{2000x^2}{2} + 10000x\Big|_{-11}^{-9}$

$= +\frac{59049}{5} - 32805 + 81000 - 90000 - \left(\frac{161051}{5} - 73205 + 121000 - 110000\right)$

$-20400 - \frac{2}{5} + 20400 = \left(-\frac{2}{5}\right)$

4) $\int_3^3 \frac{1}{2\pi} e^{-\left(\frac{x-1}{2}\right)^2} dx = 0$

5) $\int_0^{\pi/4} \operatorname{sen} x \cos^3 x \, dx$

$u = \cos x \quad du = -\operatorname{sen} x \, dx$

$-\int u^3 du = \frac{-u^4}{4} + C = \frac{-\cos^4 x}{4} + C$

$\int_0^{\pi/4} \operatorname{sen} x \cos^3 x \, dx = \frac{-\cos^4 x}{4} \Big|_0^{\pi/4} = -\frac{1}{16} + \frac{1}{4} = \left(\frac{3}{16}\right)$

6) $\int_0^{\ln 2} x^2 e^x dx$

$uv - \int v \, du$

$u = x^2 \quad v = e^x$

$du = 2x \quad dv = e^x dx$

$\int 2x e^x dx$

$u = 2x \quad v = e^x$

$du = 2 \quad dv = e^x dx$

$e^x x^2 - \int 2x e^x dx = e^x x^2 - (2x e^x - \int 2 e^x dx)$

$= e^x(x^2 - 2x) + 2e^x = e^x(x^2 - 2x + 2)$

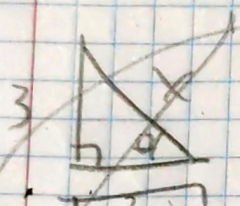
$\int_0^{\ln 2} x^2 e^x dx = e^x(x^2 - 2x + 2) \Big|_0^{\ln 2} = 2(\ln^2 2 - 2\ln 2 + 2) - 2$

$= 2\ln^2 2 - 4\ln 2 + 2$

7) $\int_{-1}^{1} x^2\,dx = \frac{x^3}{3}\Big|_{-1}^{1} = \frac{1}{3} - \left(-\frac{1}{3}\right) = \frac{2}{3}$

8) $\int_{-1}^{1} x^3\,dx = \frac{x^4}{4}\Big|_{-1}^{1} = \frac{1}{4} - \frac{1}{4} = 0$

9) $\int_{0}^{2} \frac{3}{x^2-9}\,dx = \frac{3}{6}\ln\left|\frac{x-3}{x+3}\right|\Big|_{0}^{2}$



$x = 3\csc\theta$

$dx = -3\csc\theta\cot\theta\,d\theta$

$\sqrt{x^2-9} = 3\cot\theta$

$$\int \frac{3\cdot(-3\csc\theta\cot\theta)\,d\theta}{3\cot\theta} = -\int \frac{\csc\theta}{\cot\theta}\,d\theta$$

$$= -\int \frac{\frac{1}{\sin\theta}}{\frac{\cos\theta}{\sin\theta}}\,d\theta = -\int \sec\theta\,d\theta = \ln|\sec\theta + \tan\theta| + C$$

$$= \ln\left|\frac{x+3}{\sqrt{x^2-9}}\right| + C$$

$$= \frac{3}{6}\ln\left|\frac{-1}{5}\right| - \frac{3}{6}\ln\left|\frac{-3}{3}\right| = -\ln(5)$$

$$\frac{1}{2} \qquad 0$$

10. $\int_{-1}^{1} |x| \, dx$

$\frac{1 \cdot 1}{2} \cdot 2 = 1$