February 2
Section 6.5

Problem #9

$$\int_1^2 \left(x^{-2}+3x^{-4}\right) dx = \left[(-1)\,x^{-1}+3\left(\frac{1}{-3}\right)x^{-3}\right]_1^2$$

$$= \left[\frac{(-1)}{x}-\frac{1}{x^3}\right]_1^2 = \left[-\frac{1}{2}-\frac{1}{2^3}\right]-\left[-\frac{1}{1}-\frac{1}{1^3}\right] = -\frac{1}{2}-\frac{1}{8}+1+1 = 2-\frac{5}{8} = \frac{11}{8}$$

Problem #11

$$\int_{-2}^{-1} e^{2x}\, dx = \frac{1}{2}e^{2x}\Big|_{-2}^{-1} = \left[\frac{1}{2}e^{2(-1)}\right]-\left[\frac{1}{2}e^{2(-2)}\right] = \frac{1}{2}e^{-2}-\frac{1}{2}e^{-4}$$

Memorized: $\int e^{ax}\, dx = \frac{1}{a}e^{ax}+C$

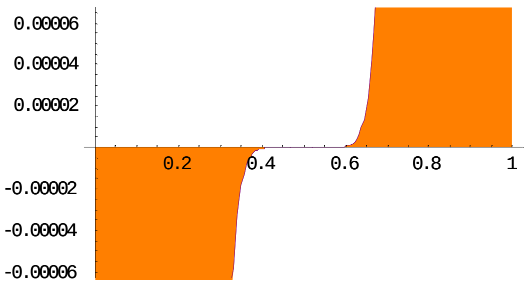
Problem #15

$$\int_0^1 (2x-1)^9\, dx$$

		x	u
$u = 2x-1$			
$du = 2\,dx$	UL	1	$2(1)-1=1$
$\frac{1}{2}du = dx$	LL	0	-1

$$\int_0^1 (2x-1)^9\, dx = \frac{1}{2}\int_{-1}^{1} u^9\, du = \left[\frac{1}{2}\frac{1}{10}u^{10}\right]_{-1}^{1} = \frac{1}{20}(1)^{10}-\frac{1}{20}(-1)^{10} = 0$$

Does this make sense?
Look at the graph f(x) = $(2x-1)^9$, with x between 0 and 1



We have two regions that look like they have the same area, but one is negative and the other is positive. So they cancel each other out.

Problem #31

average value of the function f(x) = x^3 on [-1, 1]

$$\frac{1}{1-(-1)}\int_{-1}^{1} x^3\, dx = \left[\frac{1}{2}\left(\frac{1}{4}\right)x^4\right]_{-1}^{1} = \frac{1}{8}(1)^4-\frac{1}{8}(-1)^4 = 0$$