February 2  
Section 6.5

Problem #9  
\[ \int_2^1 (x^2 + 3x^{-4}) \, dx = \left[ (-1)x^{-1} + 3\left(\frac{1}{-3}\right)x^{-3}\right]^2 \]
\[ = \left[ \frac{-1}{x} - \frac{1}{x^2} \right]^2 = \left[ \frac{-1}{2} - \frac{1}{2^2}\right] - \left[ \frac{-1}{1} - \frac{1}{1^3}\right] = \frac{-1}{2} - \frac{1}{8} + 1 + 1 = 2 - \frac{5}{8} = \frac{11}{8} \]

Problem #11  
\[ \int_{-2}^{-1} e^{2x} \, dx = \frac{1}{2} \left[ e^{2x}\right]^{-1}_{-2} = \frac{1}{2} e^{2(-1)} - \frac{1}{2} e^{2(-2)} = \frac{1}{2} e^{-2} - \frac{1}{2} e^{-4} \]

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

Problem #15  
\[ \int_0^1 (2x-1)^9 \, dx \]
\[ u = 2x - 1 \quad \quad x \quad \quad u \]
\[ du = 2 \, dx \quad \quad UL \quad 1 \quad 2(1) - 1 = 1 \]
\[ \frac{1}{2} \, du = dx \quad \quad LL \quad 0 \quad -1 \]
\[ \int_0^1 (2x-1)^9 \, dx = \frac{1}{2} \int_{-1}^0 u^9 \, du = \left[ \frac{1}{2} \frac{1}{10} u^{10}\right]_{-1}^1 = \frac{1}{20} (1)^{10} - \frac{1}{20} (-1)^{10} = 0 \]

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

![Graph of f(x) = (2x - 1)^9](image)

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