I. Find the indicated integral. You must explicitly show any substitutions you use. Neatly show all of your work, clearly indicate your answers. (5 points each - 15 total)

(a) $\displaystyle\int_{1}^{e/3} \frac{1-\ln 3x}{x}\,dx$

(b) $\displaystyle\int \frac{\sin\sqrt{w}}{\sqrt{w}}\,dw$

(c) $\displaystyle\int_{0}^{1} (1+3x^2)^2\,dx$

II. Let $f(x) = x^3 + x^2 + \dfrac{1}{4}$ and $g(x) = -x^3 + x + \dfrac{1}{4}$. You are given a graph of these two functions below. Set up (DO NOT INTEGRATE) an integral or sum of integrals to find the shaded area. Neatly show all of your work and clearly indicate your answer. (5 points)

Plot for Problem II

f(x)
g(x)