(1) Evaluate each of the following integrals.

(a) \( \int \frac{dx}{2\sqrt{x^2 + 2x}} \).

(b) \( \int \tan^5 x \sec^5 x \, dx \).

(c) \( \int \frac{\sec x}{\ln(\sec x + \tan x)} \, dx \).
(d) \int_0^{\ln 2} 4e^x \sinh x \, dx.

(e) \int \frac{\tan^{-1} x}{x^2} \, dx.

(f) \int_0^{\pi/12} \frac{3\tan 3x}{\cos^3 3x} \, dx.
(g) \int \frac{e^x}{e^{2x} + 2e^x - 2e^x + 1} \, dx. \text{ Hint: } u^4 - 2u^3 + 2u^2 - 2u + 1 = (u - 1)^2(u^2 + 1)

(h) \int \frac{(\ln(\ln x))^2 \ln x^e}{x^2} \, dx.

(i) \int \frac{1}{2 + \cos x} \, dx.
(j) $\int_{0}^{63} \frac{dx}{\sqrt{x+1} + \sqrt{x+1}}$.

(k) $\int \sin(3 \ln x) \, dx$.

(l) $\int \frac{dx}{\sqrt{2x^2 - 4x + 3}}$.

(m) $\int \sin^{-1} x \, dx$. 
(2) (a) Set up, BUT DO NOT EVALUATE, an integral or sum of integrals that gives the area of the region R in the first quadrant enclosed by \( y = x^2 \), \( y = 2 + x \), and \( x = 0 \).

(i) integrate with respect to \( x \).  
(ii) integrate with respect to \( y \).

(b) Set up, BUT DO NOT EVALUATE, an integral or sum of integrals that gives the volume generated by revolving the region enclosed by \( x = 9 \) and \( x = y^2 \) about \( x \)-axis.

(i) integrate with respect to \( x \).  
(ii) integrate with respect to \( y \).
(3) (a) Set up the partial fraction decomposition of \( \frac{1}{x^2 - x} \).

(DO NOT CALCULATE THE CONSTANTS)

(b) Find the length of the curve \( y = \frac{2x^{3/2}}{2} \) from \( x = 0 \) to \( x = 1 \).

(c) Determine if the integral \( \int_{0}^{2} \frac{2(x-2)}{x^2 - 4x + 3} \) converges or diverges.