1. Use substitution to compute each integral:

(a) $\displaystyle\int_0^1 xe^{-x^2}\,dx$

(b) $\displaystyle\int_0^1 \frac{x^2}{2x^3+1}\,dx$

(c) $\displaystyle\int_e^{e^2} \frac{1}{x\sqrt{\ln x}}\,dx$

(d) $\displaystyle\int_0^{\pi/2} \frac{\sin(2x)}{2+\cos(2x)}\,dx$

2. Find the area of the region enclosed by $y^2 = 4x$ and $y = 4x - 2$ (sketch of the region is required for full credit).

3. Given that $F(x) = \int_0^x \sqrt{8t - t^2}\ dt$, for $x \in [0, 8]$, do the following:

(a) Determine the values of $F(0)$, $F(4)$, $F(8)$. Hint: Complete the square and use geometry.
(b) Determine $F'(x)$ and $F''(x)$.
(c) Based on parts (a) and (b), sketch the graph of the function $y = F(x)$, for $x \in [0, 8]$. What kind of point is $x = 4$ for the graph of $y = F(x)$?