Honors Math 182 Quiz 5 Version A

1. A 12-foot wire is cut into 12 pieces, which are soldered together to form a rectangular frame whose base is twice as long as it is wide as shown in the figure. The frame is then covered with paper.

   (i) How should the wire be cut if the volume of the frame is to be maximized?
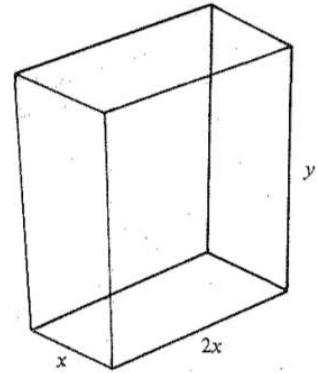
   (ii) How should the wire be cut if the total surface area of the frame is to be maximized?

2. Find the following antiderivatives. Use Maple or other technology if needed.

(i) $\displaystyle\int \cos^3 x\, dx$

(ii) $\displaystyle\int \sqrt{1 + \frac{1}{x}}\, dx$

(iii) $\displaystyle\int \frac{x^2 + 1}{x^2 + x - 6}\, dx$

3. Consider the integral $\displaystyle\int_0^4 \sqrt{1 + x^2}\, dx$.

(i) Make the change of variables $x = u^2$ in the above integral.

(ii) Make the change of variables $v = x^2$ in the above integral.