Question 6 (10 marks)

(a) Use integration by parts to show that $\int \arccos x \, dx = x \arccos x - \sqrt{1 - x^2} + c$.

(2 marks)

(b) (i) On the axes in Figure 5, draw and label the graph of $f(x) = \arccos x - \frac{\pi}{2}$ for $-1 \leq x \leq 1$.

(2 marks)

(ii) On the axes in Figure 5, draw and label the graph of $y = |f(x)|$ for $-1 \leq x \leq 1$. (1 mark)

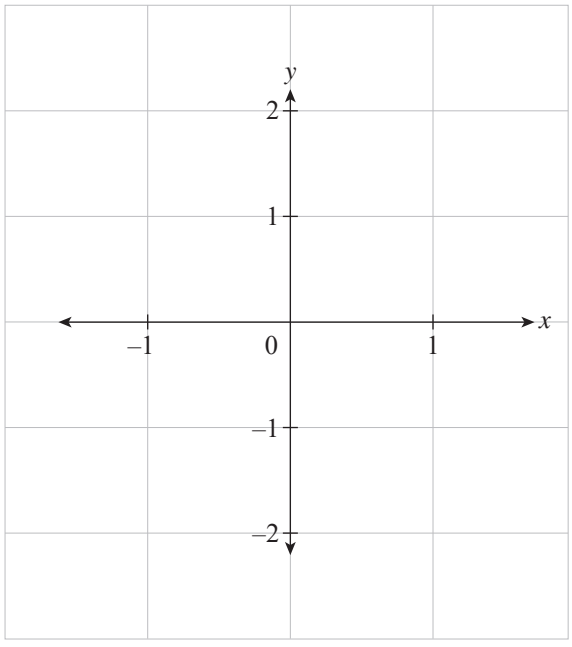

Figure 5

(iii) On the axes in Figure 6, draw the graph of $y = f(|x|)$ for $-1 \leq x \leq 1$.

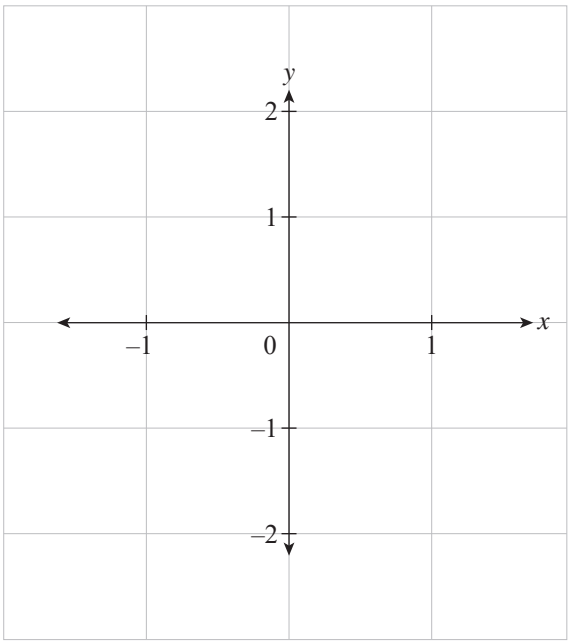

Figure 6

(1 mark)

(c) Using part (a) and part (b)(iii), show that the area between the graph of $y = f(|x|)$ and the y-axis for $0 \leq x \leq 1$ is 1 square unit.

(4 marks)