

## Some Sample Problems

1. Find the antiderivative:  $\int \sqrt{\tan(x)} dx$
2. What is the sum of  $1 + \frac{1}{2} + \frac{1}{3} - \frac{1}{4} - \frac{1}{5} - \frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{9} - \frac{1}{10} - \frac{1}{11} - \frac{1}{12} + \dots$
3. Find the total perimeter of  $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ , where  $a$  is a fixed positive number.
4. Let  $f(x) = \int_1^x \frac{\ln(t)}{1+t} dt$  for  $x > 0$ . Find  $f(x) + f(\frac{1}{x})$ .  
(As a check:  $f(2) + f(\frac{1}{2}) = \frac{1}{2}(\ln 2)^2$ .)