

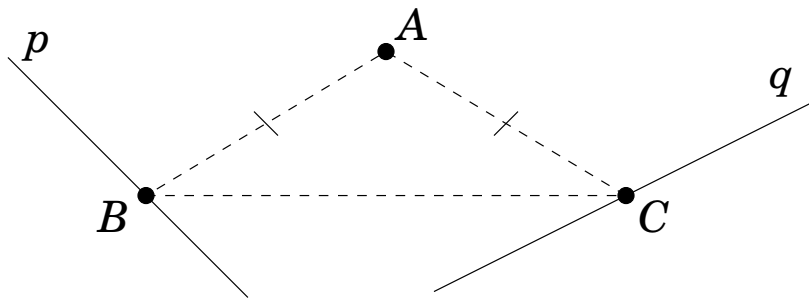
## Practice Test 3

**Evaluate the integral** (5 points):

•  $\int_{-1}^1 |x| dx = \underline{\hspace{4cm}}$

**and do any 3 of the following problems** (15 points each):

- Given a point  $A$ , and two lines  $p$  and  $q$ , find a point  $B$  on  $p$  and a point  $C$  on  $q$  such that the triangle  $ABC$  is isosceles with  $AB = AC$ , and the base  $BC$  is horizontal. Assume that a solution exists.



- Find the greatest common divisor  $d$  of  $a = 46$  and  $b = 32$ , and integer numbers  $x$  and  $y$  such that  $xa + yb = d$ .
- Starting with 2, 0, 0, 3, we construct the sequence 2, 0, 0, 3, 5, 8, 6, ..., where each new digit is the mod 10 sum of the preceding four terms. Prove that the 4-tuple 0, 5, 0, 5 will never occur.
- Find a number  $c$  such that the line  $y = x - 1$  is tangent to the parabola  $y = cx^2$ .

**Extra credit** (15 points):

- A sequence  $\{a_n\}$  is defined recursively by the equations

$$a_0 = a_1 = 1 \quad n(n-1)a_n = (n-1)(n-2)a_{n-1} - (n-3)a_{n-2}.$$

Find the sum of the series  $\sum_{n=0}^{\infty} a_n$ .