

**MATH 100 – WORKSHEET 21**  
**OPTIMIZATION**

Problem-solving steps: (0) read carefully (1) Draw picture, fix coordinate system;  
(2) parametrize; (3) Enforce relations; (4) Calculus; (5) Endgame.

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- (1) (Final 2012) The right-angled triangle  $\triangle ABP$  ( $AP$  is the hypotenuse) has the vertex  $A = (-1, 0)$ , the vertex  $P$  lie on the semicircle  $y = \sqrt{1 - x^2}$  and the vertex  $B$  on the  $x$ -axis. What is the largest possible area of this triangle?

- (2) (Final 2010) A river running east-west is 6km wide. City A is located on the shore of the river; city B is located 8km to the east on the opposite bank. It costs \$40/km to build a bridge across the river, \$20/km to build a road along it. What is the cheapest way to construct a path between the cities?