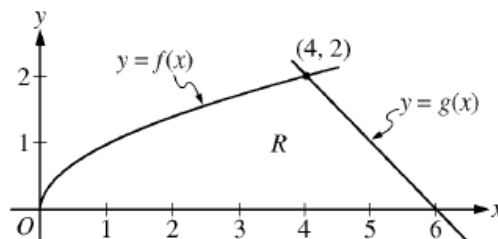


**AP Calculus AB**  
Practice Test #5b  
No Calculator (HW)

Name \_\_\_\_\_  
Period \_\_\_\_\_ Date \_\_\_\_\_

1)

The functions  $f$  and  $g$  are given by  $f(x) = \sqrt{x}$  and  $g(x) = 6 - x$ . Let  $R$  be the region bounded by the  $x$ -axis and the graphs of  $f$  and  $g$ , as shown in the figure above.



- (a) Find the area of  $R$ .
- (b) The region  $R$  is the base of a solid. For each  $y$ , where  $0 \leq y \leq 2$ , the cross section of the solid taken perpendicular to the  $y$ -axis is a rectangle whose base lies in  $R$  and whose height is  $2y$ . Write, but do not evaluate, an integral expression that gives the volume of the solid.
- (c) There is a point  $P$  on the graph of  $f$  at which the line tangent to the graph of  $f$  is perpendicular to the graph of  $g$ . Find the coordinates of point  $P$ .

2)

Two particles move along the  $x$ -axis. For  $0 \leq t \leq 6$ , the position of particle  $P$  at time  $t$  is given by  $p(t) = 2 \cos\left(\frac{\pi}{4}t\right)$ , while the position of particle  $R$  at time  $t$  is given by  $r(t) = t^3 - 6t^2 + 9t + 3$ .

- (a) For  $0 \leq t \leq 6$ , find all times  $t$  during which particle  $R$  is moving to the right.
- (b) For  $0 \leq t \leq 6$ , find all times  $t$  during which the two particles travel in opposite directions.
- (c) Find the acceleration of particle  $P$  at time  $t = 3$ . Is particle  $P$  speeding up, slowing down, or doing neither at time  $t = 3$ ? Explain your reasoning.
- (d) Write, but do not evaluate, an expression for the average distance between the two particles on the interval  $1 \leq t \leq 3$ .