

**MATH 111**  
Exam I — Green  
Hints and Answers

1. (a) HINT: Compute the slope of the diagonal line through the outflow graph at  $t = 3$ .  
ANSWER: 0.75-ish
- (b) HINT: Use the “rolling ruler” method to find the diagonal line through the outflow graph with the smallest slope.  
ANSWER: 4.2-ish
- (c) HINT: Draw a line through the origin with slope 0.9. That is your inflow graph, assuming the reservoir is empty at  $t = 0$ . Find the greatest vertical distance between the inflow graph and the outflow graph.  
ANSWER: 0.7-ish
- (d) ANSWER:  $\frac{O(5) - O(1)}{5 - 1}$  or  $\frac{O(5) - O(1)}{4}$
- (e) ANSWER: the amount of water (in thousands of gallons) that flows out of the reservoir from  $t = 4$  to  $t = 5$
2. (a) HINT: Compute the slope of the tangent line to  $TR$  at  $q = 3.5$ .  
ANSWER: 1.75-ish
- (b) ANSWER: The graph of  $TC$  is a line with slope 0.75 and “ $y$ ”-intercept of 2 (thousand).
- (c) ANSWER: 0.7-ish and 9.3-ish
- (d) ANSWER: 5-ish
- (e) ANSWER: 5.6-ish
3. (a) HINT: From the graph, we see that  $AVC(350) = 1.9$ . We know that  $AVC(350) = \frac{VC(350)}{350}$ . So,  $VC(350) = 1.9 \times 350$ .  
ANSWER: 665-ish
- (b) HINT: Compute  $VC(100)$  and  $VC(300)$  as in part (a) and subtract.  
ANSWER: 150-ish
- (c) HINT: Compute  $VC(800)$  as in part (a). Then  $TC(800) = VC(800) + FC$ .  
ANSWER: 5440-ish
- (d) HINT: Compute  $TC(600)$  as in part (c). Since each bucket sells for \$4.80,  $TR(600) = 600 \times 4.80$ . Then, profit is  $TR(600) - TC(600)$ .  
ANSWER: 330-ish
- (e) HINT: Read the smallest value of  $AVC$  off the graph.  
ANSWER: \$1.60-ish
- (f) HINT: The shutdown price is the smallest value of  $AVC$ .  
ANSWER: The same as part (e).