

MATH 111 D
Exam I — Version 1
Hints and Answers

1. (16 points - 4 points each)

- (a) ANSWER: We accepted answers between 0.80 and 0.87.
- (b) HINT: Draw a diagonal line with slope 2 and find the time at which it intersects the inflow graph.
ANSWER: We accepted answers bigger than 2, up to 2.5.
- (c) i. ANSWER: $\frac{A(3.5 + h) - A(3.5)}{h} = 1.6$
ii. ANSWER: During the 4 hours beginning at time h , 3 thousand gallons flowed into the reservoir.

2. (18 points)

- (a) (2 points) ANSWER: \$400
- (b) (6 points) ANSWERS: $AC = \$153.33$, $AVC = \$20$
- (c) (3 points) ANSWER: $MC = \$20$
- (d) (3 points) ANSWER: 77
- (e) (4 points) HINT: Profit is maximized at the first whole-number value of q at which $MR < MC$.
ANSWER: $q = 9$

3. (16 points – 4 points each)

- (a) ANSWERS: There were two such times. We accepted answers between 2.5 and 3 and between 5.5 and 6.
- (b) HINT: The height of the graph at $t = 7.5$ gives the overall rate of flow at $t = 7.5$. That is, the height of the graph at $t = 7.5$ gives $\frac{R(7.5)}{7.5}$. Find that height and solve for $R(7.5)$.
ANSWER: We accepted answers between 1.65 and 1.73.
- (c) HINT: Repeat the process from part (b) twice with $t = 1$ and $t = 4$. Then subtract: $R(4) - R(1)$.
ANSWER: We accepted answers between 1.00 and 1.06.
- (d) HINT: Repeat the process from part (c) with $t = 2$ and $t = 6$. Then divide by 4, the number of hours.
ANSWER: We accepted answers between 0.25 and 0.27.