MATH 112 C
Exam I - Version 1 - Hints and Answers
January 29, 2004

1. ANSWERS: D, B, C, A

2. (a) ANSWER: ii
   (b) ANSWER: A
   (c) ANSWER: A
   (d) ANSWER: ii

3. (a) ANSWER: $MC(q) = -0.21q^2 + 3.12q + 2.83$
   (b) HINT: Compute $MC(4)$.
   ANSWER: 11.95 dollars
   (c) i. HINT: Profit is greatest at the quantity at which $MR = MC$. Set $MR = MC$ and solve for q, using the quadratic formula.
   ANSWER: $q = 7.30$ hundred Items
   ii. ANSWER: $q = 5$ hundred Items
   EXPLANATION: From $q = 2$ to 5 hundred Items, marginal revenue is larger than marginal cost. This means that profit is increasing on this entire interval. Therefore, the profit is highest at the high end of the interval, at $q = 5$.
   iii. HINT: The slope of the tangent line to MR is given by the derivative of MR. So, compute $MR'(q)$, set it equal to 7 and solve for q.
   ANSWER: $q = 0.7$

4. (a) HINT: $f(4+h) = -2(4+h)^2 + 18(4+h) + 9$, $f(4+h) - f(4) = 2h - 2h^2$
   ANSWER: $\dfrac{f(4+h) - f(4)}{h} = 2 - 2h$
   (b) ANSWER: $f'(x) = -4x + 18$
   (c) HINT: Use the formula for $\dfrac{g(m+h) - g(m)}{h}$ with $m = 2$ and $h = 0.003$.
   ANSWER: $\dfrac{g(2.003) - g(2)}{0.003} = 8.009$
   (d) HINT: Use the formula for $\dfrac{g(m+h) - g(m)}{h}$ with $m = 4$ and $h = k$. This gives $\dfrac{g(4+k) - g(4)}{k} = 20 + 3k$. Multiply both sides by k to get $g(4+k) - g(4)$.
   ANSWER: $g(4+k) - g(4) = 20k + 3k^2$
   (e) HINT: Set $f'(a) = 6$ and solve for a: $-4a + 18 = 6 \Rightarrow a = 3$. Compute the derivative of g by letting h go to 0 in the formula for $\dfrac{g(m+h) - g(m)}{h}$: $g'(m) = 6m - 4$. Compute $g'(3)$.
   ANSWER: 14