

MATH 112 — Exam II Review Answers

1. (a) $x = 4$ gives a local max; $x = 9$ gives a local min.
 (b) $x = 9.75$
 (c) $x = 10.39$
2. (a) from $q = 0$ to $q = 49.775$ thousand Gizmos
 (b) concave up
 (c) $q = 120.25$ thousand Gizmos
 (d) $q = 1.16$ gives a local min; $q = 25.84$ gives a local max
3. (a) $m \approx 0.25, 7.5$
 (b) from 1 to 2
 (c) T, F, F, T
 (d) $A(1) \approx 1.28125$
 (e) $A'(12) \approx -2.7$
 (f) $A''(5) \approx -2/3$
 (g) $x \approx 0.2, 4.25$, OR 9.75
 (h) $A(4) - A(2) \approx 3.5$
4. (a) **PRICE** for the global minimum value = 12.69 dollars
PRICE for the global maximum value = 8.00 dollars
 (b) $q = 1$ corresponds to a local max; $q = 3$ corresponds to a local min.
5. (a) $t = 36.25$
 (b) $t = 2, 11$
 (c) concave up
 (d) $g(t) = 0.048t^2 - 0.48t + 1.422$
 (e) A is smaller
6. (a) $D(x) = 5x^3 - 21x^2 + 24x + 9$
 $D'(x) = 15x^2 - 42x + 24$
 $D''(x) = 30x - 42$
 $T(x) = 20x^3 - 63x^2 + 48x + 9$
 $T'(x) = 60x^2 - 126x + 48$
 $T''(x) = 120x - 126$
 (b) $x = 0.8$ and 2
 (c) $x = 0.8$ gives a local max. $x = 2$ gives a local min.
 (d) largest = 474, smallest = 114
7. (a) $q = 24$

- (b) $P(q) = \frac{2}{3}(q + 25)^{3/2} - \frac{250}{3} - \frac{1}{12}q^2 - 3q - 10$
 $P'(q) = \sqrt{q + 25} - \frac{1}{6}q - 3$
 $P''(q) = \frac{1}{2}(q + 25)^{-1/2} - \frac{1}{6}$
- (c) $P(q)$ has a local max at $q = 24$.
- (d) $AC(q)$ is concave up at $q = 50$.
8. (a) $q = 36.63$ thousand Items
 (b) $q = 14.25$ thousand Items
 (c) $TR(q) = 200q - 2.73q^2$; $VC(q) = q^3 - 24q^2 + 197q$
 (d) $FC = 297.34$ thousand dollars
 (e) 264
 (f) It is the change in Total Cost that occurs when quantity increases from 2 to 10 thousand Items.
9. (a) from $q = 0$ to $q = 10$ thousand Items
 (b) TR has critical points at $q = 3.92$ and 12.74 thousand Items
 (c) TR has a local max at $q = 3.92$ and a local min at $q = 12.74$
10. (a) from $t = 3$ to $t = 8$ minutes
 (b) $t = 8$
 (c) $A(t) = 2t^3 - 33t^2 + 144t + 125$
 (d) 10 gallons per minute
 (e) 76 gallons
11. (a) $x = 10$ and 20
 (b) $x = 10$ gives a local max. $x = 20$ gives a local min.
 (c) increasing, since $f'(0) = 200 > 0$
 (d) 185.33
12. (a) $A(2) - A(1) = 21.17$ feet
 (b) $A(0) = 376$ feet
 (c) $A(t)$ has a local min at $t = 15.48$ hours and a local max at $t = 4.52$ hours
 (d) $B(t) = -\frac{3}{2}t^2 + 24t + 200$
13. (a) MIN VALUE=13.33; MAX VALUE = 482.67
 (b) from $x = 2$ to $x = 2.5$
 (c) $h(x)$ has a local max at $x = 4$
14. (a) $TR(q) = -q^3 + 20q^2 + 19q$ and $TC(q) = \frac{1}{3}q^3 - 6q^2 + 124q + 15$
 (b) $q = 10.5$ thousand Shazerbots
 (c) $AC(q)$ is concave up at $q = 2$

15. (a) $t = -3, 1$
(b) $t = -3$ gives a local max, $t = 1$ gives a local min
(c) i. $f(t)$ is concave up at $t = 7$.
ii. $t = 7$ gives neither a local max nor a local min since $t = 7$ is not a critical value of f .
(d) 1910
16. (a) 660 Hundred Dollars
(b) 2069.75 Hundred Dollars
(c) 33.54 Hundred Things
(d) -0.29
17. (a) $TR(q) = 15q - 4q^{3/2}$, $TR'(q) = 15 - 6q^{1/2}$
(b) $q = 6.25$
(c) $q = 6.25$ gives a local maximum.
(d) $q = 4.69$ Thousand Trinkets
(e) $FC = 3.16$ Thousand Dollars