Business and Economics Applications

In problems 1-4, Find the number of units x that produces a maximum revenue R.

1. $R = 500x - x^2$	2. $R = -4x^2 + 200x + 300$
3. $R = 50x^2 - 5x^3$	4. $R = 70 + 20x^2 - x^3$

In problems 5-8, Find the number of unit x that produces the minimum average cost per unit $\overline{C}$

5. $C = 0.5x^2 + 30x + 1000$	6. $C = 0.01x^2 + 4x + 70$
7. $C = 4x^2 + 200x + 1000$	8. $C = x^3 + 27x + 400$

In problems 9-12, Find the price that will maximize profit for the demand and cost functions, where p is the price, x is the number of units, and C is the cost.

9. $\text{Demand Function}: p = 90 - x$ $\text{Cost Function}: C = 300 + 50x$	10. $\text{Demand Function}: p = 55 - 0.02x$ $\text{Cost Function}: C = 0.2x^2 + 30x + 2000$
11. $\text{Demand Function}: p = 20 - \sqrt{x}$ $\text{Cost Function}: C = 15x + 200$	12. $\text{Demand Function}: p = \dfrac{10}{\sqrt{x}}$ $\text{Cost Function}: C = 0.5x + 800$

In problems 13-14, Use the cost function to find the production level at which the average cost is a minimum.

13. $C = 3x^2 - 12x + 6$	14. $C = x^3 - 8x^2 + 12x$

In problems 15-16, Find the amount s spent on advertising (in thousands of dollars) that maximizes the profit P. Find the point of diminishing returns.

15. $P = \dfrac{-1}{6}s^3 + \dfrac{3}{2}s^2 + 20s + 2$	16. $P = -0.2s^3 + 4s^2 + 500$

Find the price elasticity of demand for the demand function at the indicated x-value. Is the demand elastic, inelastic, or of unit elasticity at the indicated x-value?

17. $\text{Demand Function}: p = 500 - 4x$ $\text{Quantity Demanded}: x = 40$	18. $\text{Demand Function}: p = 200 - 5x$ $\text{Quantity Demanded}: x = 20$

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19. Demand Function : $p = \dfrac{400}{x+2}$ Quantity Demanded : $x = 100$	20. Demand Function : $p = \dfrac{800}{x+8}$ Quantity Demanded : $x = 25$