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Date _____
Algebra 2

Profit

1. Mr. Schlansky's tutoring revenue can be represented by $r(x) = 25x^2 - 90x + 14$ and his costs can be represented by $c(x) = 12x^2 + 21x + 10$. If his profit can be determined using $p(x) = r(x) - c(x)$, write a polynomial function what would represent $p(x)$.

$$\begin{aligned} & r(x) - c(x) \\ & (25x^2 - 90x + 14) - (12x^2 + 21x + 10) \\ & 25x^2 - 90x + 14 - 12x^2 - 21x - 10 \\ & \underline{13x^2 - 111x + 4} \end{aligned}$$

2. Stone Manufacturing has developed a cost model, $C(x) = 0.18x^3 + 0.02x^2 + 4x + 180$, where x is the number of sprockets sold, in thousands. The sales price can be modeled by $S(x) = 95.4 - 6x$ and the company's revenue by $R(x) = x \cdot S(x)$. The company's profits, $R(x) - C(x)$, could be modeled by

- 1) $0.18x^3 + 6.02x^2 + 91.4x + 180$ 3) $-0.18x^3 - 6.02x^2 + 91.4x - 180$
2) $0.18x^3 - 5.98x^2 - 91.4x + 180$ 4) $0.18x^3 + 5.98x^2 + 99.4x + 180$

$$\begin{aligned} & r(x) - c(x) \\ & x(95.4 - 6x) - (0.18x^3 + 0.02x^2 + 4x + 180) \\ & 95.4x - 6x^2 - 0.18x^3 - 0.02x^2 - 4x - 180 \\ & \underline{-0.18x^3 - 6.02x^2 + 91.4x - 180} \end{aligned}$$

3. A manufacturing company has developed a cost model, $C(x) = 0.15x^3 + 0.01x^2 + 2x + 120$, where x is the number of items sold, in thousands. The sales price can be modeled by $S(x) = 30 - 0.01x$. Therefore, revenue is modeled by $R(x) = x \cdot S(x)$. The company's profit, $P(x) = R(x) - C(x)$, could be modeled by

- 1) $0.15x^3 + 0.02x^2 - 28x + 120$ 3) $-0.15x^3 + 0.01x^2 - 2.01x - 120$
2) $-0.15x^3 - 0.02x^2 + 28x - 120$ 4) $-0.15x^3 + 32x + 120$

$$\begin{aligned} & r(x) - c(x) \\ & x(30 - 0.01x) - (0.15x^3 + 0.01x^2 + 2x + 120) \\ & 30x - 0.01x^2 - 0.15x^3 - 0.01x^2 - 2x - 120 \\ & \underline{-0.15x^3 - 0.02x^2 + 28x - 120} \end{aligned}$$

4. A major car company analyzes its revenue, $R(x)$, and costs $C(x)$, in millions of dollars over a fifteen-year period. The company represents its revenue and costs as a function of time, in years, x , using the given functions.

$$R(x) = 550x^3 - 12,000x^2 + 83,000x + 7000$$

$$C(x) = 880x^3 - 21,000x^2 + 150,000x - 160,000$$

The company's profits can be represented as the difference between its revenue and costs. Write the profit function, $P(x)$, as a polynomial in standard form.

$$\begin{aligned} P(x) &= R(x) - C(x) \\ &= (550x^3 - 12,000x^2 + 83,000x + 7000) - (880x^3 - 21,000x^2 + 150,000x - 160,000) \\ &= 550x^3 - 12,000x^2 + 83,000x + 7000 - 880x^3 + 21,000x^2 - 150,000x + 160,000 \\ &= -330x^3 + 9,000x^2 - 67,000x + 167,000 \end{aligned}$$

5. The profit function, $p(x)$, is found by subtracting the cost function, $c(x)$, from the revenue function, $r(x)$. Which function below represents the cost function given $p(x) = -15x^2 + 600x + 60$ and $r(x) = -0.4x^2 + 130x + 1200$?

1) $c(x) = -14.6x^2 + 470x - 1140$

3) $c(x) = 14.6x^2 - 470x + 1140$

2) $c(x) = -14.6x^2 + 730x - 1260$

4) $c(x) = 14.6x^2 + 730x - 1260$

$$\begin{aligned} c(x) &= r(x) - p(x) \\ &= (-0.4x^2 + 130x + 1200) - (-15x^2 + 600x + 60) \\ &= -0.4x^2 + 130x + 1200 + 15x^2 - 600x - 60 \\ &= 14.6x^2 - 470x + 1140 \end{aligned}$$

6. The profit function, $p(x)$, for a company is the cost function, $c(x)$, subtracted from the revenue function, $r(x)$. The profit function for the Acme Corporation is $p(x) = -0.5x^2 + 250x - 300$ and the revenue function is $r(x) = -0.3x^2 + 150x$. The cost function for the Acme Corporation is

1) $c(x) = 0.2x^2 - 100x + 300$

3) $c(x) = -0.2x^2 + 100x - 300$

2) $c(x) = 0.2x^2 + 100x + 300$

4) $c(x) = -0.8x^2 + 400x - 300$

$$\begin{aligned} c(x) &= r(x) - p(x) \\ &= (-0.3x^2 + 150x) - (-0.5x^2 + 250x - 300) \\ &= -0.3x^2 + 150x + 0.5x^2 - 250x + 300 \\ &= 0.2x^2 - 100x + 300 \end{aligned}$$