1. Find the absolute extrema of the function given by $f(x) = 4 + \dfrac{36}{x}$ on the interval $[1,6]$.

2. An open box is to made by cutting a square from each corner of a 12-inch by 12-inch piece of metal and then folding up the sides. The finished box must be at least 1.5 inches deep, but not deeper than 3 inches. What size square be cut from each corner in order to produce a box of maximum volume?

3. Find $dy/dx$ for $x^2 + 2xy^2 + 3x^2y = 0$.

4. The graph of $x^2 + 5y^2 = 36$ is the equation of the tangent line at the point (4, 2).

5. Solve $3^{2x} = 4^{x+1}$.

6. Find the minimum value of $f(x,y) = 5x^2 + 6y^2 - xy$, subject to the constraint $x + 2y = 24$.

7. Suppose the price, in cents, for a certain product is $p(x) = 900 - 20x - x^2$, when the demand for the product is $x$ units. Also, suppose the function $p(x) = x^2 + 10x$ gives the price, in cents, when the supply is $x$ units. Find the consumers' surplus and the producers' surplus.

8. Find $\displaystyle\int_0^3 x\sqrt{1+x}\,dx$.

9. A company that manufactures computers has determined that its production function is given by $p(x,y) = 500x + 800y + 3x^2y - x^3 - \dfrac{y^4}{4}$, where $x$ is the size of the labor force (measured in work hours per week) and $y$ is the amount of capital (measured in units of $1000) invested. Find the marginal productivity of labor and capital when $x = 50$ and $y = 20$, and interpret the results.

10. Find $\displaystyle\iint\limits_R \sqrt{x} \cdot \sqrt{y-2}\,dxdy$ over the rectangular region $R$ defined by $0 \le x \le 4$, $3 \le y \le 11$.

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