

PRACTICE PROBLEMS ON MAXIMA AND MINIMA

Find the extreme values of the following functions :

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| <p>1. $x^2y^3(1 - x - y)$</p> <p>3. $xy(3a - x - y)$</p> <p>5. $x^2y - 3x^2 - 2y^2 - 4y + 3$</p> <p>7. $y^2 + 4xy + 3x^2 + x^3$</p> <p>9. Find the maximum value of $\cos A \cos B \cos C$, where A, B, C are angles of a triangle.</p> <p>10. Find the maximum volume of a parallelepiped inscribed in a sphere $x^2 + y^2 + z^2 = a^2$</p> <p>11. A rectangular box with open top has volume V. Find the dimensions of the box requiring least material.</p> | <p>2. $x^3y^2(1 - x - y)$</p> <p>4. $xy(3 - x - y)$</p> <p>6. $x^3 + 3xy^2 - 3x^2 + 3y^2 + 4$</p> <p>8. $2(x^2 - y^2) - x^4 + y^4$</p> |
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ANSWERS

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| <p>1. Max. value $1/432$ at $(1/3, 1/2)$.</p> <p>3. Max. value a^3 at (a, a).</p> <p>5. Max. value 5 at $(0, -1)$.</p> <p>7. Min. at $\left(\frac{2}{3}, \frac{-4}{3}\right)$</p> <p>9. Max. value $\frac{1}{8}$ at $\left(\frac{\pi}{3}, \frac{\pi}{3}\right)$</p> <p>11. $x = y = 2z$</p> | <p>2. Max. value $1/432$ at $(1/2, 1/3)$.</p> <p>4. Max. value 1 at $(1, 1)$</p> <p>6. Min. value 0 at $(2, 0)$.</p> <p>8. No stationary value.</p> <p>10. $8a^3/3\sqrt{3}$.</p> |
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