

Optimization Worksheet

Sixteen substantial modeling problems with constraints, domains, critical points, and verification.

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Name: _____ **Date:** _____

1. Squares of side x are cut from a 12 by 12 sheet. Maximize the open box volume.
2. Squares of side x are cut from a 20 by 12 sheet. Maximize volume.
3. Use 240 m of fence for three sides of a riverside rectangle. Maximize area.
4. A 600 m rectangle has one divider parallel to its width. Maximize area.
5. A poster has area 384 cm squared with 2 cm side margins and 3 cm top and bottom margins. Minimize total paper area.
6. Find the closed cylinder of volume 250π with minimum surface area.
7. Find the point on $y=x$ squared closest to $(0,3)$.

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8. Maximize the area of a rectangle inscribed under $y = \sqrt{25-x^2}$.
 9. Cut 20 m of wire into a square and a circle to minimize total area.
 10. Demand is $p = 80 - 2q$. Maximize revenue.
 11. Minimize average cost $C(q)/q$ when $C(q) = q^2 + 100q + 2500$.
 12. A 10 ft ladder rests against a wall. Maximize the area of the right triangle it forms.
 13. A cone has volume 72π . Under the material model $S = \pi r^2 + \pi rh$, minimize S .
 14. A Norman window has perimeter 20. Maximize area.
 15. A boat 3 km offshore must reach a town 8 km downshore. Row at 3 km/h and walk at 5 km/h. Minimize time.

16. Maximize $f(x)=x(6-x)$ on the closed interval $[1,5]$.