Calculus Review Worksheet – Max./Min. Problems

- (1) Find two numbers whose sum is 12 if the product of the square of one number with the square root of the other number is to be a maximum.
- (2) Find the maximum and minimum value of $y = 4x^3 3x^2 36x + 10$, if $0 \le x \le 4$.
- (3) Find the area of the largest triangle if the lengths of two of its sides are 10 and 12.
- (4) Find the area of the largest rectangle, which may be inscribed under the ellipse $x^2 + 4y^2 = 4$ if one side of the rectangle is on the x-axis, while the vertices of the opposite side are on the ellipse.
- (5) Find the dimensions of the largest rectangular box if the length of the base of the box is to be three times the width, and the total surface area of the box is to be 200 square inches.
- (6) Find the area of the largest isosceles trapezoid, which may be inscribed under the graph of the semicircle $y = \sqrt{4 x^2}$ if the vertices of one base are at (-2, 0) and (2, 0), while the other vertices are on the semicircle.
- (7) Find the coordinates of the point on the graph of $y = -2x^2 + 12$ which is closest to the point (10, 5).
- (8) Find the volume of the largest right circular cylinder, which may be inscribed inside a right circular cone if the radius of the base of the cone is 8 inches, and the height of the cone is 12 inches
- (9) A computer company wishes to run a cable from point A which is located on the shore of a river to a point B which is located on an island 4 miles downstream and 1 mile offshore. The costs of running the cable are \$300 per mile on land and \$500 per mile in the water. Find the length of the cable, which should be run on land if the total cost of the project is to be as small as possible.

Calculus Review Worksheet – Max./Min. Problems Answers

- (1) $\frac{48}{5}$ and $\frac{12}{5}$
- (2) Max. = 74, Min = -42
- **(3)** 60
- (4) 2
- (5) $\frac{10}{3}$ in. by 10 in. by 5 in.
- **(6)** 3√3
- (7) (2,4)
- (8) $\frac{1024 \, \pi}{9} \, \ln^3$
- (9) $\frac{13}{4}$ mile