MAT 145: Quiz #9 (10 points)

Calculator OK!

Name _____   Calculator Used _____   Score _____

(1) Choose ONE of the optimization problems described here. Solve the problem, showing **complete evidence and calculus justification**. Include a drawing or a graph to represent the situation. (10 pts)

(A) Determine all ordered pairs on the curve $y = \frac{1}{2}x^2$ that are closest to the point (6,0).

(B) A segment through the point (2,7) has an endpoint A = (0,y) on the positive y axis and another endpoint B = (x,0) on the positive x axis. If the origin is labeled point P, determine the ordered pairs A and B so that triangle ABP has the smallest area possible.

(C) A rectangular field is to be fenced. If we represent the field as rectangle ABCD, the cost of the fence for side AB is $8 per foot, the cost of the fence for side CD is $8 per foot, the cost of the fence for side BC is $2 per foot, and the cost of the fence for side DA is $7 per foot. We have $800 available to pay for fence materials. Determine the dimensions of the rectangle ABCD that will fence in the largest area using exactly $800.

(D) Kilroy must construct an open-topped box whose base is twice as long as it is wide. If the box must have a volume of exactly 60 cubic ft., determine the dimensions of the box that will minimize the surface area of the box.

(E) Francine has a cardboard rectangle measuring 2 feet wide by 1 foot long. She will cut congruent squares from each corner of the rectangle and fold up the remaining flaps to create an open-topped box. Determine the size of the congruent squares to remove so that the box will have maximum volume.

(2) Determine each anti-derivative. No calculators may be used for these problems.

(a) $\int 4x^3 dx$

(b) $\int 2 \cos t \, dt$

(c) $\int \frac{1}{r} - e^{3r} dr$

| BONUS! | BONUS! | BONUS! |