MATH-1150 (DUPRÉ) SPRING 2011 QUIZ 7 ANSWERS

Wednesday 28 March 2012

DIRECTIONS

FIRST: PRINT YOUR LAST NAME IN LARGE CAPITAL LETTERS ON THE UPPER RIGHT CORNER OF EACH SHEET TURNED IN.

SECOND: PRINT YOUR FIRST NAME IN CAPITAL LETTERS DIRECTLY UNDERNEATH YOUR LAST NAME ON EACH SHEET TURNED IN.

THIRD: WRITE YOUR CORRECT SPRING 2011 MATH-1150 SECTION NUMBER DIRECTLY UNDERNEATH YOU FIRST NAME ON EACH SHEET TURNED IN.

FOURTH: Write NEATLY and CLEARLY, putting your answers in the space provided. If I cannot read it you do not get credit.

FIFTH: Any failure to follow any part of any of the above directions can result in additional loss of credit.

1. Suppose that a toy store owner wants to fence off a rectangular area in a corner of his store for an electric train display. He only needs to have fencing on two sides of the area since the area is to be in a corner and the two adjacent walls will serve as two sides of the rectangle. If the total length of fencing he has is 20 feet, what are the dimensions of the rectangular area with the maximum area he can make?

ANSWER: Since he only needs to supply two sides of the rectangle, call one side x and the other y so $x+y=20$. The area is $A=xy$, and as $y=20-x$, we have the area as a function of x alone is simply

$$A(x)=x(20-x)=20x-x^2.$$

To find the maximum possible area, we differentiate $A(x)$ and set the derivative equal to zero. This gives

$$0=A'(x)=20-2x,$$

so the only solution is $x=10$, which means $y=20-x=20-10=10$, so both sides of the rectangle are 10 feet and therefore it is a square of area 100 square feet.

2. What is the area above the $x-$axis and under the graph of the function $f(x)=x^3$ between the vertical lines $x=0$ and $x=2$?

ANSWER:

$$A=\int_0^2 x^3\,dx=\left[\frac{x^4}{4}\right]_0^2=\frac{2^4}{4}-\frac{0^4}{4}=4-0=4.$$