Problem	1	2	3	4	5	6	Total
Score							

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1(15pts) (a) For the definite integral $\int_0^\pi \sin x \, dx$, find the right point Riemann sum R_{10} either by hand or by calculator.

(b) If $\int_0^3 f(x)dx = 3$ and $\int_0^1 f(x)dx = -1$, find $\int_1^3 f(x)dx$.

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2(15pts) Consider the sum $S_n = \sum_{k=1}^{n} \frac{(2k-1)^2}{n^3}$.

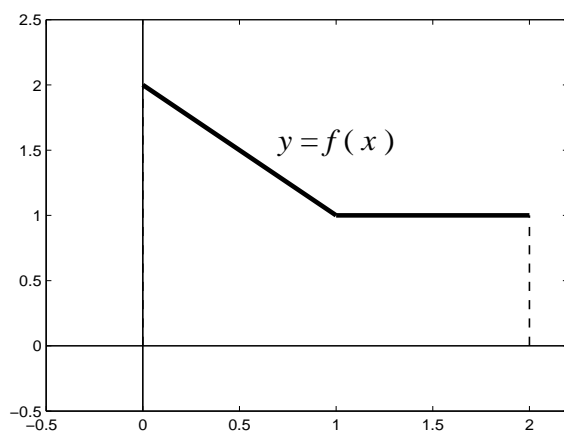(a) Find the numerical value for S_2.

(b) Find a formula for S_n all n. (You need the formulas $\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$ and $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$.)

(c) Find the limit $\lim_{n\to\infty} S_n$.

3(20pts) Find the exact point on the line $y = 2 - 2x$ that is nearest to the origin.

4(10pts) The graph of a function $y = f(x)$ is given below. Find the definite integral $\int_0^2 f(x)dx$.

$y = f(x)$

5(20pts) Some values of a function $f(x)$ is given below:

x	2.5	2.625	2.75	2.875	3
$f(x)$	0.2	-0.1	-.2	-0.32	-0.58

Approximate $\displaystyle\int_{2.5}^{3} f(x)dx$ by the following Riemann sums:

(a) The left point sum L_4.

(b) The right point sum R_4.

(c) The midpoint sum M_2.

(d) The trapezoid sum T_4.

(e) The Simpson sum S_2.

6(15pts) In an endurance contest, contestants 2 miles at sea need to reach a location 2 miles inland and 3 miles east (the shoreline runs east-west). Assume a contestant can swim 4 mph and run 10 mph. To what point on the shoreline should the person swim to minimize the total time? (It is important to set up the problem correctly. Use graphical method to find the numerical answer.)