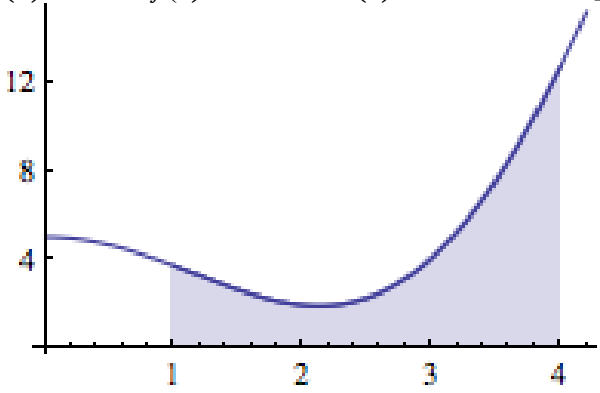
BC 2 Name:_____

Approximations 3

(1) Let $f(x) = x^2 + 5\cos(x)$ on the interval [1, 4].



Use the Riemann program to complete the table below. Give 3 decimal places.

number of rectangles	Left-Hand Endpoint	Midpoint	Right-Hand Endpoint
$N = 5$			
$N = 10$			
$N = 20$			
$N = 40$			

Does the convergence improve in all three cases above as N grows larger? Are there any exceptions to this?

(2) Let g be a strictly increasing function. Draw pictures with left- and right-hand rectangle approximations. What can be said about the relationship between the values of the LH, MP, and RH approximations over a given interval $[a, b]$ for any given number of rectangles? (Give an inequality.)

Continuing with our increasing function g, we want to consider concavity. Draw pictures with g concave up and with g concave down. Does concavity affect whether the approximation is too high or too low? Explain.

(3) Now assume that h is a decreasing function over an interval $[a, b]$. What is the relationship between the values of the LH, MP, and RH approximations?

Will concavity have an effect on this relationship?

(4) If j is a linear function, what can be said about the relationship between the values of the LH, MP, and RH approximations for any given number of rectangles? Draw a picture to illustrate this.

To demonstrate this further, choose a linear function j, an interval, and a value of N. Find the three approximations (LH, MP, RH) with your calculator program. Confirm that the relationship you stated above does actually hold in this example.