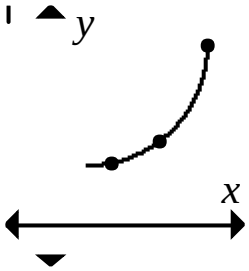
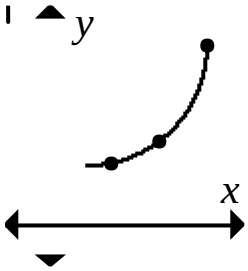
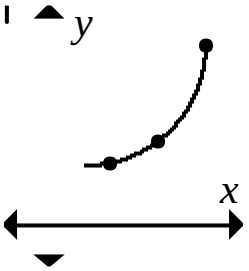
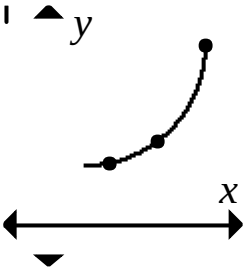
Riemann Sums and Over/Underestimates

1. Sketch each sum using the given points. Shade in the definite integral.

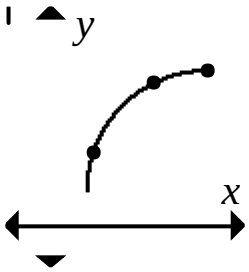
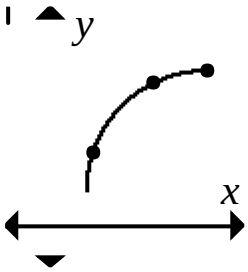
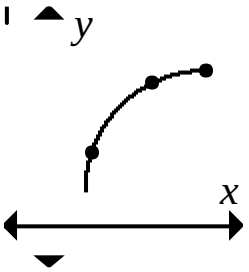
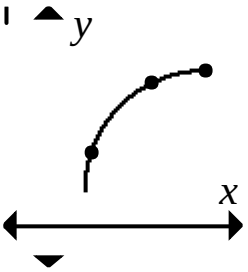
Increasing and Concave Up			
Left Sum "*L*"	Right Sum "*R*"	Trapezoidal "*T*"	Integral "*I*"
			

Which of the following correctly orders the sums from least to greatest?

(a) $L < R < T < I$ (b) $R < I < T < L$ (c) $L < I < T < R$

(d) $R < T < I < L$ (e) $L < T < I < R$

2. Sketch each sum using the given points. Shade in the definite integral.

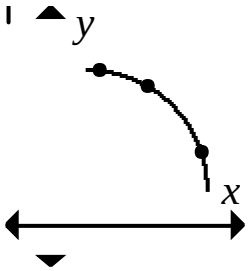
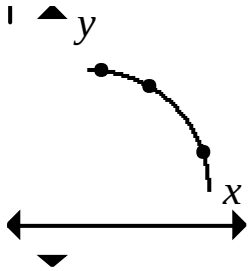
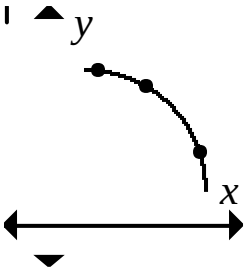
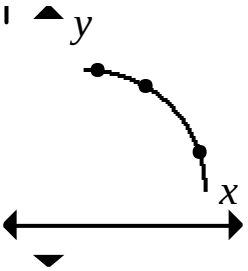
Increasing and Concave Down			
Left Sum "*L*"	Right Sum "*R*"	Trapezoidal "*T*"	Integral "*I*"
			

Which of the following correctly orders the sums from least to greatest?

(a) $L < R < T < I$ (b) $R < I < T < L$ (c) $L < I < T < R$

(d) $R < T < I < L$ (e) $L < T < I < R$

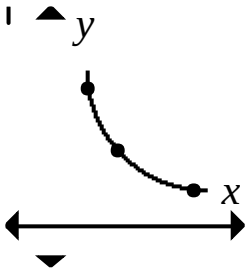
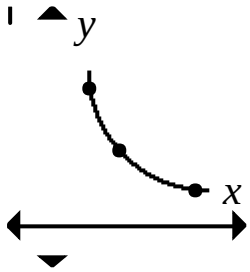
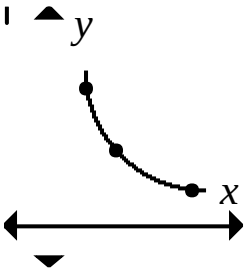
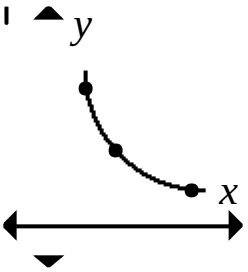
3. Sketch each sum using the given points. Shade in the definite integral.

Decreasing and Concave Down			
Left Sum "*L*"	Right Sum "*R*"	Trapezoidal "*T*"	Integral "*I*"
			

Which of the following correctly orders the sums from least to greatest?

(a) $L < R < T < I$ (b) $R < I < T < L$ (c) $L < I < T < R$
(d) $R < T < I < L$ (e) $L < T < I < R$

4. Sketch each sum using the given points. Shade in the definite integral.

Decreasing and Concave Up			
Left Sum "*L*"	Right Sum "*R*"	Trapezoidal "*T*"	Integral "*I*"
			

Which of the following correctly orders the sums from least to greatest?

(a) $L < R < T < I$ (b) $R < I < T < L$ (c) $L < I < T < R$
(d) $R < T < I < L$ (e) $L < T < I < R$