ESP Math 179

Worksheet 22

Riemann Sums

28 January 2020

Spring 2020

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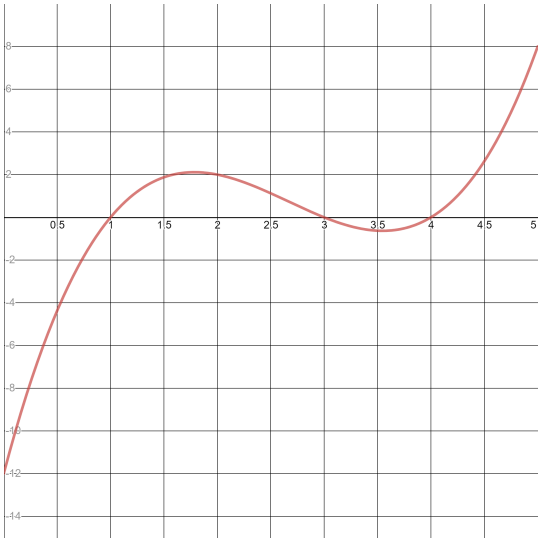
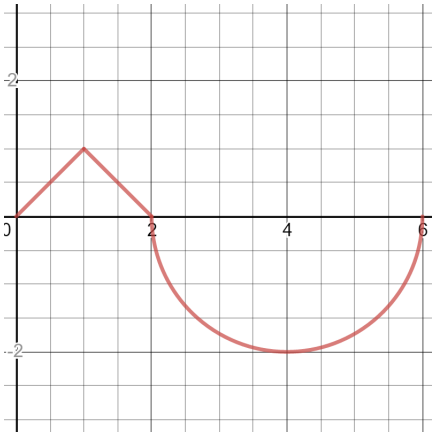
1. **(Review)** Determine where the function $f(x) = \dfrac{x^2 - 9}{2x^2 - 10x + 12}$ is discontinuous.
2. **(Review)** Use the Intermediate Value Theorem to show that $25 - 8x^2 - x^3 = 0$ has a solution in the interval $[-2, 4]$.
3. **(Warm-up)** What is the definition of a Riemann sum for a function $f(x)$ on an interval $[a, b]$? What are Riemann sums useful for?
4. **(Warm-up)** Sketch the graph of $f(x) = x^2$ on the interval $[0, 5]$. Draw the left endpoint approximation for the area under the graph, and calculate the left Riemann sum that corresponds to the rectangles. Is this an over or under estimate?
5. Consider the function $f(x) = x^3 - 8x^2 + 19x - 12 = (x - 1)(x - 3)(x - 4)$ on the interval $[0, 5]$ (the graph is shown below)



   (a) Sketch the midpoint approximation for $f(x)$.

   (b) Calculate the left, right, and midpoint Riemann sums for $f(x)$ on $[0, 5]$.

6. Consider the following graph of a function g:



   By examining the graph, compute the following:

   (a) $\displaystyle\int_0^2 g(x)\,dx$

   (b) $\displaystyle\int_2^6 g(x)\,dx$

   (c) $\displaystyle\int_0^6 g(x)\,dx$