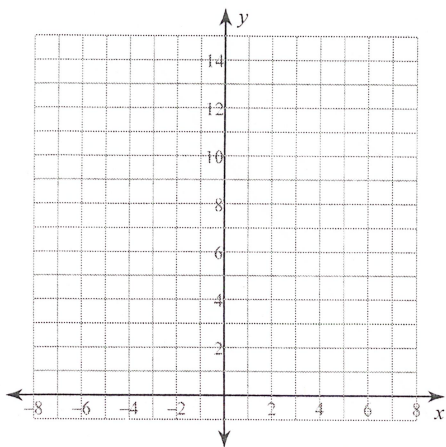


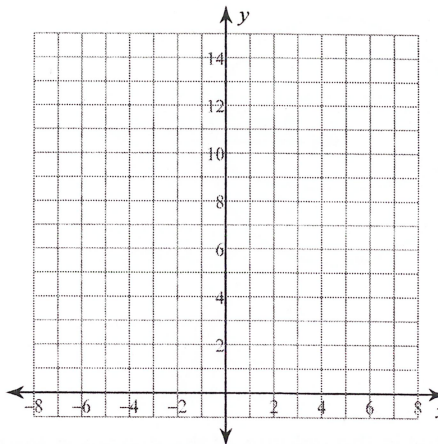
Riemann Sums

For each problem, approximate the area under the curve over the given interval using 4 left endpoint rectangles. You may use the provided graph to sketch the curve and rectangles.

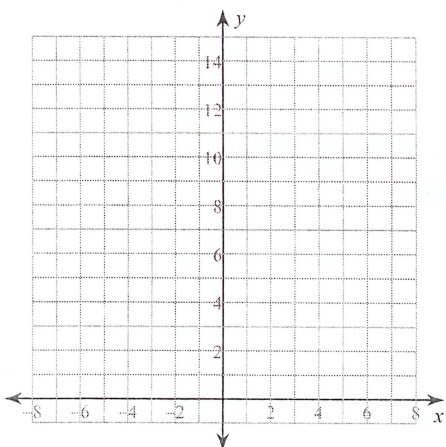
1) $y = -x^2 - 2x + 9$; $[-3, 1]$



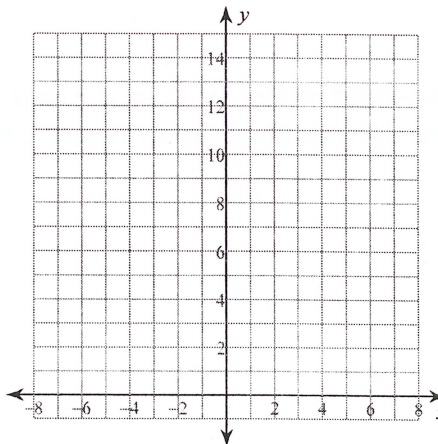
2) $y = -\frac{5}{x}$; $[-6, -2]$



3) $y = -x^2 - 2x + 11$; $[-4, 0]$

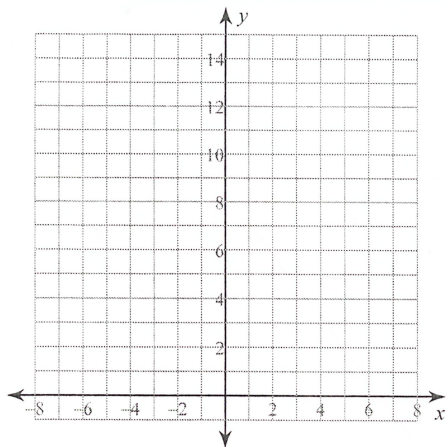


4) $y = \frac{4}{x}$; $[1, 5]$

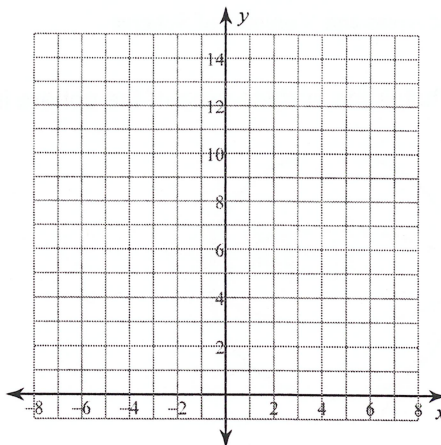


For each problem, approximate the area under the curve over the given interval using 4 right endpoint rectangles. You may use the provided graph to sketch the curve and rectangles.

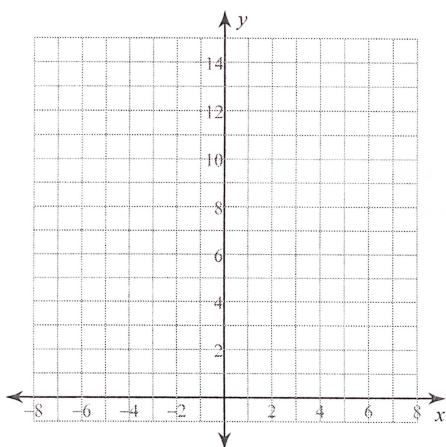
5) $y = \frac{x^2}{2} - x + 2$; $[0, 4]$



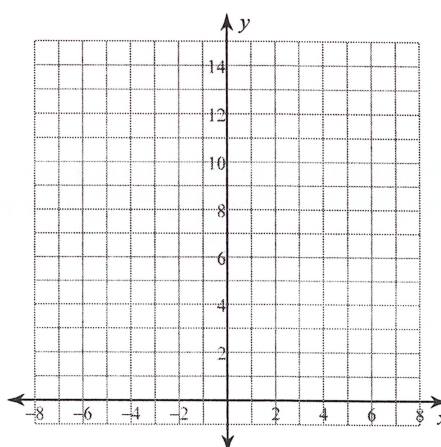
6) $y = -\frac{x^2}{2} + x + 5$; $[-2, 2]$



7) $y = \frac{4}{x}$; $[1, 5]$

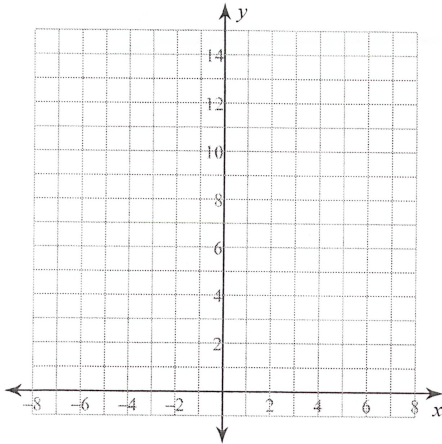


8) $y = \frac{3}{x}$; $[2, 6]$

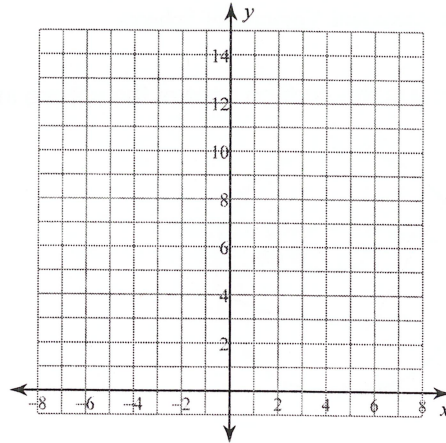


For each problem, approximate the area under the curve over the given interval using 4 midpoint rectangles. You may use the provided graph to sketch the curve and rectangles.

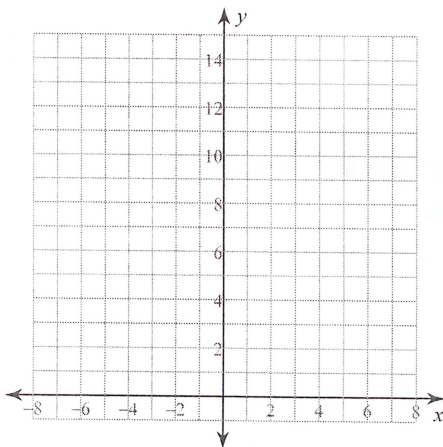
9) $y = x^2 - 2x + 3; [-2, 2]$



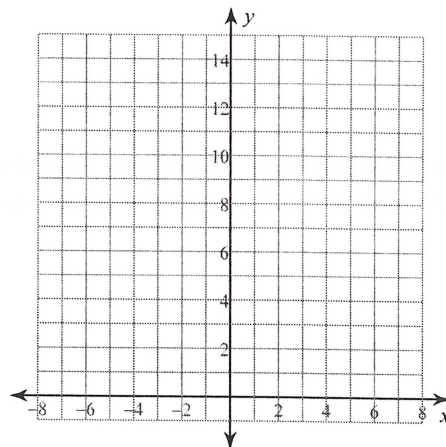
10) $y = -\frac{x^2}{2} - x + 5; [-3, 1]$



11) $y = \frac{3}{x}; [1, 5]$



12) $y = -\frac{4}{x}; [-5, -1]$



Answers to Riemann Sums

1) 34

5) 13

9) 17

2) $\frac{19}{4} = 4.75$

6) 19

10) $\frac{39}{2} = 19.5$

3) 34

7) $\frac{77}{15} \approx 5.133$

11) $\frac{496}{105} \approx 4.724$

4) $\frac{25}{3} \approx 8.333$

8) $\frac{57}{20} = 2.85$

12) $\frac{1984}{315} \approx 6.298$