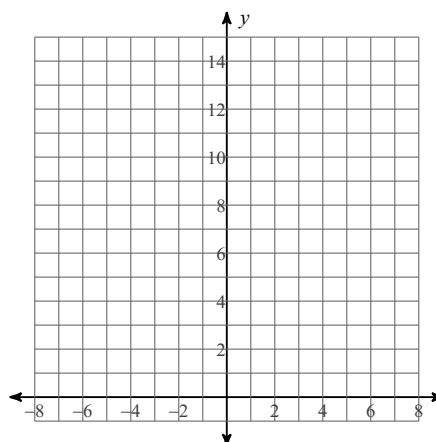
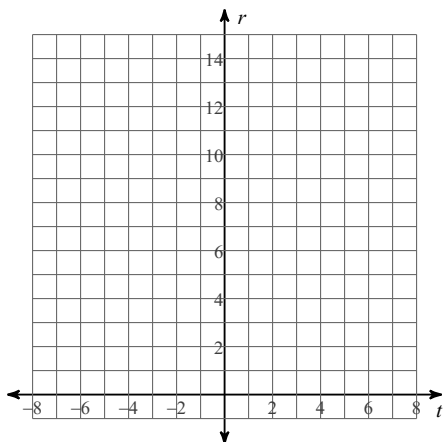


Worksheet 9 - Approximating Area Under the Curve

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) $r = -\frac{4}{t}; [-6, -2]$

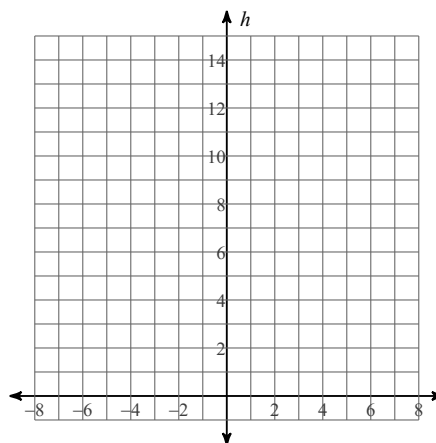
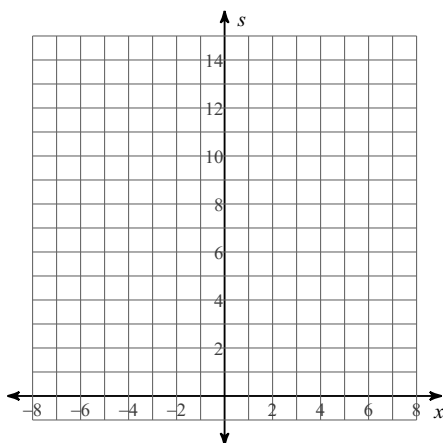
2) $y = -\frac{s^2}{2} + 6; [-2, 2]$



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.

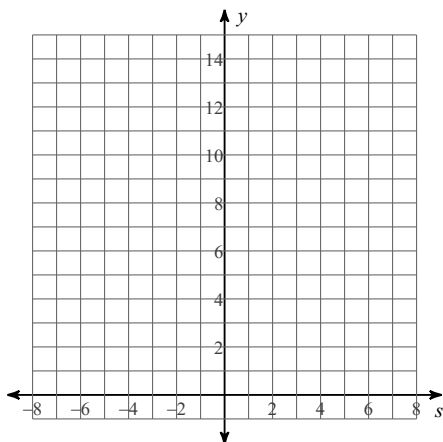
3) $s = x + 5; [1, 5]$

4) $h = r^2 - 2r + 2; [0, 4]$

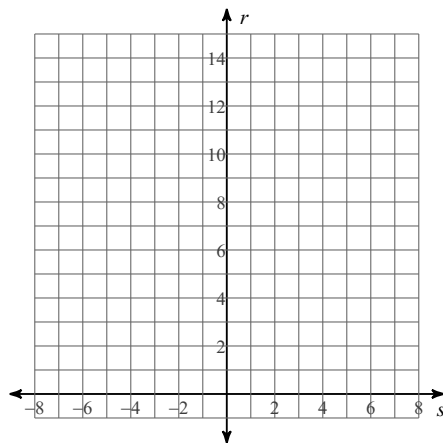


For each problem, approximate the area under the curve over the given interval using 4 inscribed rectangles. You may use the provided graph to sketch the curve and rectangles.

5) $y = -s^2 + 11$; $[-1, 3]$

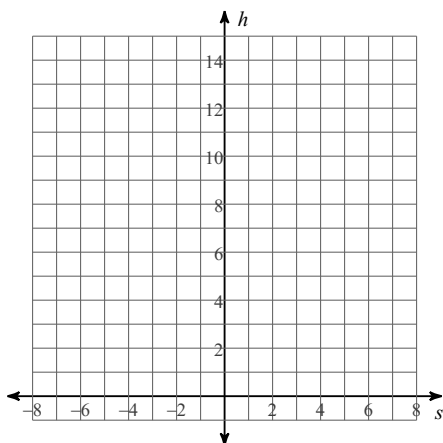


6) $r = \frac{2}{s}$; $[1, 3]$

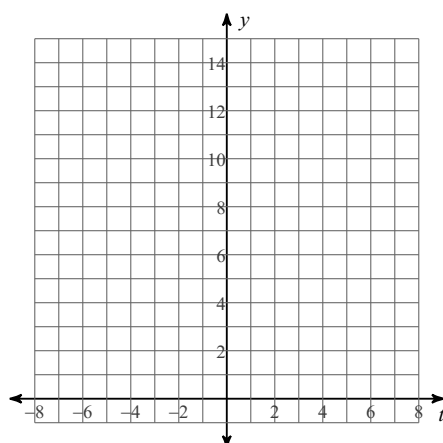


For each problem, approximate the area under the curve over the given interval using 5 circumscribed rectangles. You may use the provided graph to sketch the curve and rectangles.

7) $h = \frac{s^2}{2} + s + 1$; $[-4, 1]$

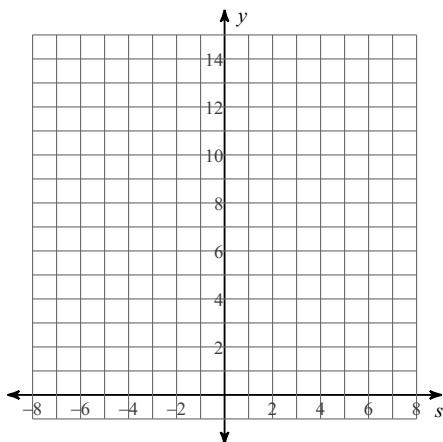


8) $y = \frac{5}{t}$; $[1, 6]$

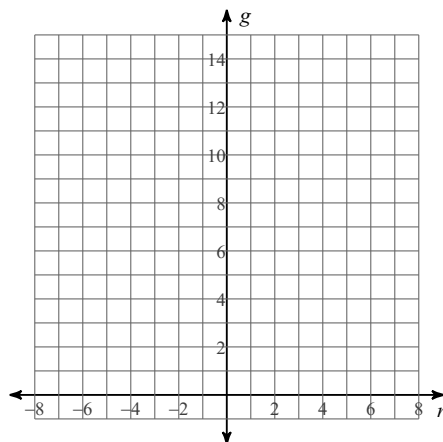


For each problem, approximate the area under the curve over the given interval using 4 midpoint rectangles. You may use the provided graph to sketch the curve and rectangles.

9) $y = -s + 6; [-4, 4]$



10) $g = -r^2 - 2r + 9; [-3, 1]$



Evaluate each indefinite integral.

11) $\int 20\sin -5x \cdot \cos^5 -5x dx$

12) $\int 27t^2(3t^3 - 5)^3 dt$

13) $\int (e^{4x} + 2)^4 \cdot 20e^{4x} dx$

14) $\int \frac{4(-2 + \ln 3r)^4}{r} dr$

For each problem, use a left-hand Riemann sum to approximate the integral based off of the values in the table.

$$15) \int_0^{39} f(x) dx$$

x	0	4	9	12	18	39
$f(x)$	2	5	6	7	9	11

$$16) \int_0^{35} f(x) dx$$

x	0	16	21	27	31	35
$f(x)$	-4	-9	-6	-4	1	3

For each problem, use a right-hand Riemann sum to approximate the integral based off of the values in the table.

$$17) \int_0^{43} f(x) dx$$

x	0	3	10	12	15	43
$f(x)$	15	16	13	11	15	13

$$18) \int_0^{21} f(x) dx$$

x	0	2	7	11	14	21
$f(x)$	-1	3	2	-2	-6	-8