SATPREP Name________________________________

Assignment - Curve sketching and Table

Date______________

For each problem, you are given a table containing some values of differentiable functions $f(x)$, $g(x)$ and their derivatives. Use the table data and the rules of differentiation to solve each problem.

1)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	3	-2	1	2
2	1	0	3	$\frac{3}{2}$
3	3	$\frac{3}{2}$	4	0
4	4	1	3	-1

Part 1) Given $h_1(x) = f(x) + g(x)$, find $h_1'(1)$

Part 2) Given $h_2(x) = f(x) - g(x)$, find $h_2'(2)$

2)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	3	-1	1	2
2	2	-1	3	$\frac{3}{2}$
3	1	$\frac{1}{2}$	4	0
4	3	2	3	-1

Part 1) Given $h_1(x) = f(x) + g(x)$, find $h_1'(1)$

Part 2) Given $h_2(x) = f(x) - g(x)$, find $h_2'(4)$

3)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	4	-1	3	-1
2	3	$-\frac{3}{2}$	2	-1
3	1	$-\frac{1}{2}$	1	0
4	2	1	2	1

Part 1) Given $h_1(x) = f(x) \cdot g(x)$, find $h_1'(1)$

Part 2) Given $h_2(x) = \frac{f(x)}{g(x)}$, find $h_2'(4)$

4)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	1	1	4	-2
2	2	1	2	$-\frac{3}{2}$
3	3	1	1	$\frac{1}{2}$
4	4	1	3	2

Part 1) Given $h_1(x) = f(x) \cdot g(x)$, find $h_1'(4)$

Part 2) Given $h_2(x) = \dfrac{f(x)}{g(x)}$, find $h_2'(2)$

5)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	1	1	3	-1
2	2	1	2	-1
3	3	1	1	0
4	4	1	2	1

Part 1) Given $h_1(x) = f(x) + g(x)$, find $h_1'(4)$

Part 2) Given $h_2(x) = f(x) - g(x)$, find $h_2'(2)$

Part 3) Given $h_3(x) = f(x) \cdot g(x)$, find $h_3'(3)$

Part 4) Given $h_4(x) = \dfrac{f(x)}{g(x)}$, find $h_4'(1)$

Part 5) Given $h_5(x) = (f(x))^2$, find $h_5'(1)$

Part 6) Given $h_6(x) = f(g(x))$, find $h_6'(2)$

6)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	4	-2	3	-1
2	2	$-\frac{3}{2}$	2	-1
3	1	0	1	0
4	2	1	2	1

Part 1) Given $h_1(x) = f(x) + g(x)$, find $h_1'(2)$

Part 2) Given $h_2(x) = f(x) - g(x)$, find $h_2'(2)$

Part 3) Given $h_3(x) = f(x) \cdot g(x)$, find $h_3'(1)$

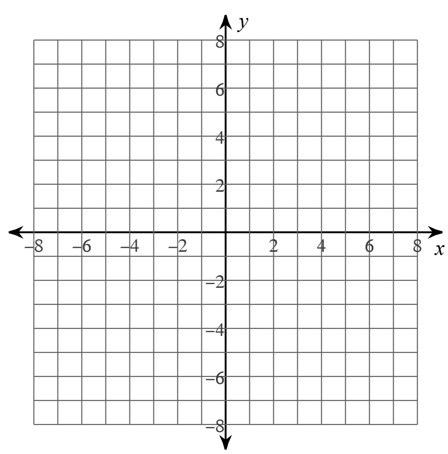
Part 4) Given $h_4(x) = \frac{f(x)}{g(x)}$, find $h_4'(2)$

Part 5) Given $h_5(x) = (f(x))^2$, find $h_5'(4)$

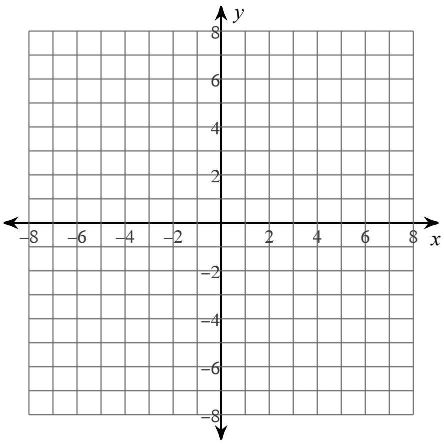
Part 6) Given $h_6(x) = f(g(x))$, find $h_6'(3)$

For each problem, find the: x and y intercepts, asymptotes, x-coordinates of the critical points, open intervals where the function is increasing and decreasing, x-coordinates of the inflection points, open intervals where the function is concave up and concave down, and relative minima and maxima. Using this information, sketch the graph of the function.

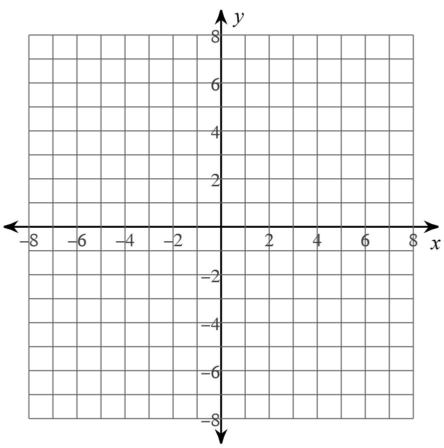
7) $y = \frac{16x}{x^2 + 16}$



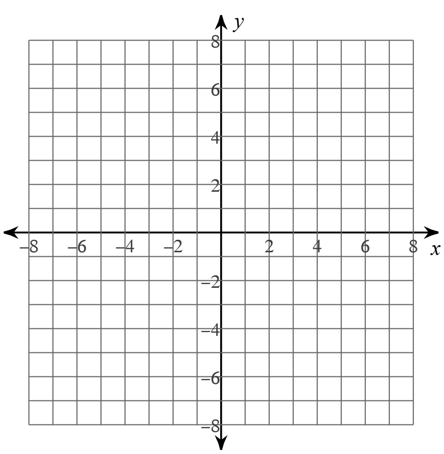
8) $y = \frac{x}{x^2 - 16}$



9) $y = -\frac{x^3}{3} + x^2$



10) $y = \frac{x^3}{3} - \frac{2x^2}{3} - \frac{4x}{3}$



Answers to Assignment - Curve sketching and Table

1) $h_1'(1) = 0$

$h_2'(2) = -\frac{3}{2}$

2) $h_1'(1) = 1$

$h_2'(4) = 3$

3) $h_1'(1) = -7$

$h_2'(4) = 0$

4) $h_1'(4) = 11$

$h_2'(2) = \frac{5}{4}$

5) $h_1'(4) = 2$

$h_2'(2) = 2$

$h_3'(3) = 1$

$h_4'(1) = \frac{4}{9}$

$h_5'(1) = 2$

$h_6'(2) = -1$

6) $h_1'(2) = -\frac{5}{2}$

$h_2'(2) = -\frac{1}{2}$

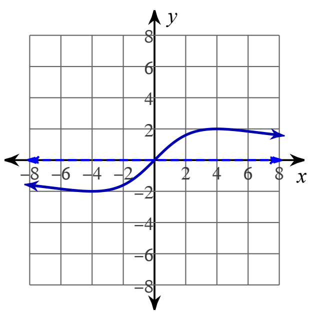
$h_3'(1) = -10$

$h_4'(2) = -\frac{1}{4}$

$h_5'(4) = 4$

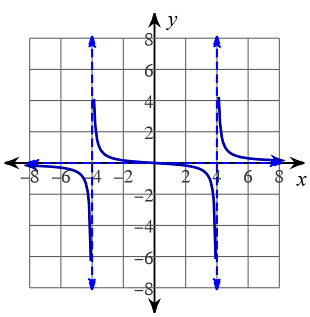
$h_6'(3) = 0$

7)



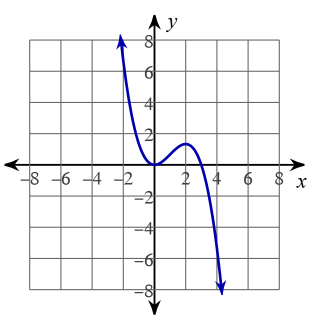
x-intercept at $x = 0$ y-intercept at $y = 0$
No vertical asymptotes exist.
Horizontal asymptote at: y = 0
Critical points at: $x = -4, 4$
Increasing: $(-4, 4)$ Decreasing: $(-\infty, -4), (4, \infty)$
Inflection points at: $x = -4\sqrt{3}, 0, 4\sqrt{3}$
Concave up: $(-4\sqrt{3}, 0), (4\sqrt{3}, \infty)$ Concave down: $(-\infty, -4\sqrt{3}), (0, 4\sqrt{3})$
Relative minimum: $(-4, -2)$ Relative maximum: $(4, 2)$

8)



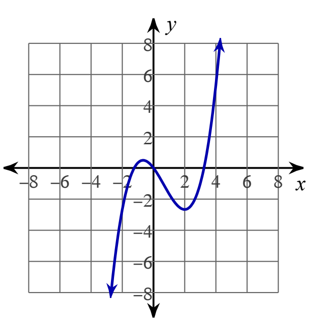
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptotes at: $x = -4, 4$
Horizontal asymptote at: y = 0
No critical points exist.
Increasing: No intervals exist. Decreasing: $(-\infty, -4), (-4, 4), (4, \infty)$
Inflection point at: $x = 0$
Concave up: $(-4, 0), (4, \infty)$ Concave down: $(-\infty, -4), (0, 4)$
No relative minima. No relative maxima.

9)



x-intercepts at $x = 0, 3$ y-intercept at $y = 0$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = 0, 2$
Increasing: $(0, 2)$ Decreasing: $(-\infty, 0), (2, \infty)$
Inflection point at: $x = 1$
Concave up: $(-\infty, 1)$ Concave down: $(1, \infty)$
Relative minimum: $(0, 0)$ Relative maximum: $\left(2, \frac{4}{3}\right)$

10)



x-intercepts at $x = 1 - \sqrt{5}, 0, 1 + \sqrt{5}$ y-intercept at $y = 0$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -\frac{2}{3}, 2$
Increasing: $\left(-\infty, -\frac{2}{3}\right), (2, \infty)$ Decreasing: $\left(-\frac{2}{3}, 2\right)$
Inflection point at: $x = \frac{2}{3}$
Concave up: $\left(\frac{2}{3}, \infty\right)$ Concave down: $\left(-\infty, \frac{2}{3}\right)$
Relative minimum: $\left(2, -\frac{8}{3}\right)$ Relative maximum: $\left(-\frac{2}{3}, \frac{40}{81}\right)$