Name: _____

Sketching Graphs of Functions—A Qualitative Approach

Fill in the blanks in the sign charts with the terms "increasing," "decreasing," "concave up," or "concave down." Then sketch the graph of a function which matches the given criteria on a sheet of graph paper.

Each graph should be at least a quarter sheet of graph paper. *Label the x-axis. Also label each "important" point (that is point where the first or second derivative is equal to zero or is undefined) with an ordered pair of the form $(a, f(a))$. (For example, if the x-coordinate is 3, label the point as $(3, f(3))$ since we are not given the value of $f(3)$.)*

1. Let f be differentiable on $\mathbb{R}$ with $\quad f'(1) = 0 \quad$ and $\quad f'(5) = 0$.

interval	$(-\infty, 1)$	$(1, 5)$	$(5, \infty)$
sign of $f'(x)$	$-$	$+$	$-$
behavior of f			

2. Let f be differentiable on $\mathbb{R}$ with $\quad f'(-3) = 0 \quad$ and $\quad f'(2) = 0$.

interval	$(-\infty, -3)$	$(-3, 2)$	$(2, \infty)$
sign of $f'(x)$	$+$	$-$	$+$
behavior of f			

3. Let f be differentiable on $\mathbb{R}$ with $\quad f'(-10) = 0 \quad$ and $\quad f'(15) = 0$.

interval	$(-\infty, -10)$	$(-10, 15)$	$(15, \infty)$
sign of $f'(x)$	$+$	$+$	$-$
behavior of f			

4. Let f be differentiable on $\mathbb{R}$ with $\quad f'(0.5) = 0 \quad$ and $\quad f'(1.5) = 0$.

interval	$(-\infty, 0.5)$	$(0.5, 1.5)$	$(1.5, \infty)$
sign of $f'(x)$	$+$	$-$	$-$
behavior of f			

5. Let f be differentiable on $\mathbb{R}$ with $f'(-100) = 0$ and $f'(50) = 0$.

interval	$(-\infty, -100)$	$(-100, 50)$	$(50, \infty)$
sign of $f'(x)$	$+$	$+$	$+$
behavior of f			

6. Let f be differentiable on $\mathbb{R}$ with $f'(25) = 0$ and $f'(35) = 0$.

interval	$(-\infty, 25)$	$(25, 35)$	$(35, \infty)$
sign of $f'(x)$	$-$	$-$	$-$
behavior of f			

7. Let f be differentiable on $\mathbb{R}$ with $f'(-2) = 0$, $f'(0) = 0$, and $f'(2) = 0$.

interval	$(-\infty, -2)$	$(-2, 0)$	$(0, 2)$	$(2, \infty)$
sign of $f'(x)$	$-$	$+$	$-$	$+$
behavior of f				

8. Let f be differentiable on $\mathbb{R}$ with $f'(-2) = 0$, $f'(0) = 0$, and $f'(2) = 0$.

interval	$(-\infty, -2)$	$(-2, 0)$	$(0, 2)$	$(2, \infty)$
sign of $f'(x)$	$+$	$-$	$-$	$+$
behavior of f				

9. Let f be differentiable on $\mathbb{R}$ with $f'(-3) = 0$, $f'(1) = 0$, and $f'(4) = 0$.

interval	$(-\infty, -3)$	$(-3, 1)$	$(1, 4)$	$(4, \infty)$
sign of $f'(x)$	$+$	$+$	$-$	$+$
behavior of f				

10. Let f be differentiable on $\mathbb{R}$ with $f'(-200) = 0$, $f'(0) = 0$, and $f'(300) = 0$.

interval	$(-\infty, -200)$	$(-200, 0)$	$(0, 300)$	$(300, \infty)$
sign of $f'(x)$	$+$	$+$	$-$	$-$
behavior of f				

11. Let f be twice differentiable on $\mathbb{R}$ with $f'(-2) = 0$, and $f'(4) = 0$; and $f''(1) = 0$.

interval	$(-\infty, -2)$	$(-2, 4)$	$(4, \infty)$
sign of $f'(x)$	$+$	$-$	$+$
behavior of f			

interval	$(-\infty, 1)$	$(1, \infty)$
sign of $f''(x)$	$-$	$+$
behavior of f		

12. Let f be twice differentiable on $\mathbb{R}$ with $f'(-5) = 0$, and $f'(5) = 0$; and $f''(0) = 0$.

interval	$(-\infty, -5)$	$(-5, 5)$	$(5, \infty)$
sign of $f'(x)$	$-$	$+$	$-$
behavior of f			

interval	$(-\infty, 0)$	$(0, \infty)$
sign of $f''(x)$	$+$	$-$
behavior of f		

13. Let f be twice differentiable on $\mathbb{R}$ with $f'(0) = 0$, and $f''(0) = 0$.

interval	$(-\infty, 0)$	$(0, \infty)$
sign of $f'(x)$	$+$	$+$
behavior of f		

interval	$(-\infty, 0)$	$(0, \infty)$
sign of $f''(x)$	$-$	$+$
behavior of f		

14. Let f be twice differentiable on $\mathbb{R}$ with $f'(2) = 0$, and $f''(2) = 0$.

interval	$(-\infty, 2)$	$(2, \infty)$
sign of $f'(x)$	$-$	$-$
behavior of f		

interval	$(-\infty, 2)$	$(2, \infty)$
sign of $f''(x)$	$+$	$-$
behavior of f		

15. Let f be twice differentiable on $\mathbb{R}$ with $f'(-1.5) = 0$, $f'(0) = 0$, and $f'(1.5) = 0$; and $f''(-1) = 0$, and $f''(1) = 0$.

interval	$(-\infty, -1.5)$	$(-1.5, 0)$	$(0, 1.5)$	$(1.5, \infty)$
sign of $f'(x)$	$-$	$+$	$-$	$+$
behavior of f				

interval	$(-\infty, -1)$	$(-1, 1)$	$(1, \infty)$
sign of $f''(x)$	$+$	$-$	$+$
behavior of f			

16. Let f be twice differentiable on $\mathbb{R}$ with $f'(-7) = 0$, $f'(-2) = 0$, and $f'(4) = 0$; and $f''(-5) = 0$, and $f''(2) = 0$.

interval	$(-\infty, -7)$	$(-7, -2)$	$(-2, 4)$	$(4, \infty)$
sign of $f'(x)$	$+$	$-$	$+$	$-$
behavior of f				

interval	$(-\infty, -5)$	$(-5, 2)$	$(2, \infty)$
sign of $f''(x)$	$-$	$+$	$-$
behavior of f			

17. Let f be twice differentiable on $\mathbb{R}$ with $f'(-40) = 0$, $f'(0) = 0$, and $f'(30) = 0$; and $f''(-40) = 0$, $f''(-15) = 0$, and $f''(15) = 0$.

interval	$(-\infty, -40)$	$(-40, 0)$	$(0, 30)$	$(30, \infty)$
sign of $f'(x)$	$-$	$-$	$+$	$-$
behavior of f				

interval	$(-\infty, -40)$	$(-40, -15)$	$(-15, 15)$	$(15, \infty)$
sign of $f''(x)$	$+$	$-$	$+$	$-$
behavior of f				