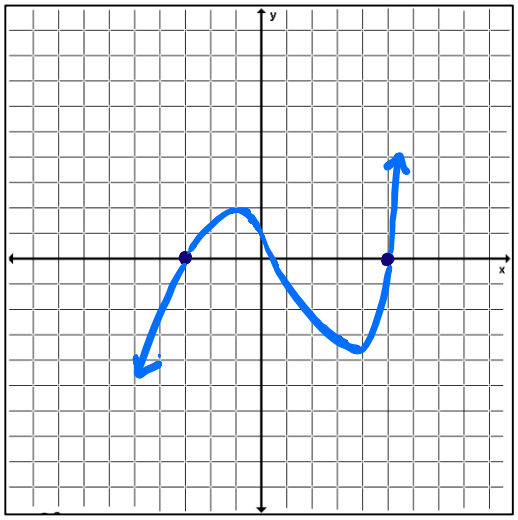
Drawing Graphs of Functions Worksheet

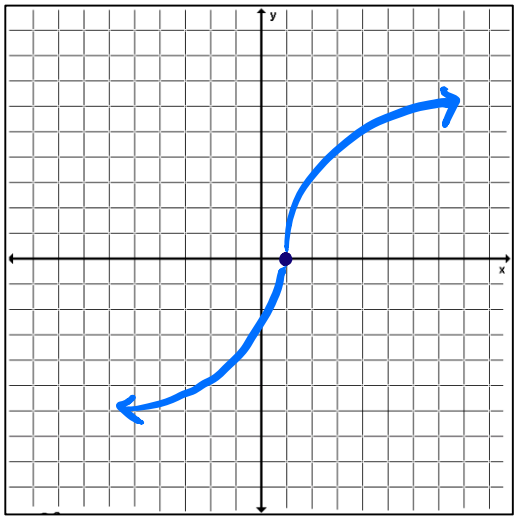
For each question, sketch a possible graph for $f(x)$ based on the given information. Label all zeros, critical points and inflection points. [hint: write out the sign analysis for f' and f'' before drawing the graph.

1. $f(x)$ is continuous and differentiable at all points
   $f(-3) = f(5) = 0$ points
   $f' > 0$ for $x < -1$ and $x > 4$ increasing
   $f' < 0$ for $-1 < x < 4$ decreasing
   $f'' < 0$ for $x < 0$ concave down
   $f'' > 0$ for $x > 0$ concave up



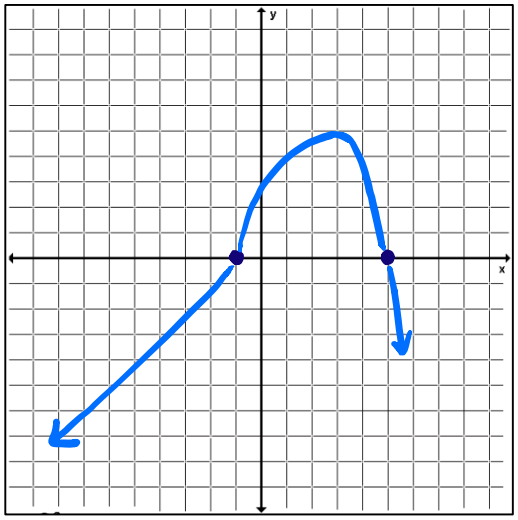
x		max −1		0		min 4	
f'(x)	+		−		−		+
f''(x)	−		−		+		+
f(x)	incr c↓		decr c↓		decr c↑		incr c↑

2. $f(x)$ is continuous at all points
   $f(1) = 0$ point
   $f' > 0$ for all x except at $x = 1$ increasing
   f' is undefined at $x = 1$ not differentiable
   $f'' > 0$ for $x < 1$ concave up
   $f'' < 0$ for $x > 1$ concave down



x		0		1	
f'(x)	+		+		+
f''(x)	+		+		−
f(x)	incr c↑		incr c↑		incr c↓

3. $f(x)$ is a piece-wise function that is continuous at all points
   $f(-1) = f(5) = 0$ points
   $f' > 0$ for all $x < 3$ except at $x = -1$ incr.
   $f' < 0$ for $x > 3$ decr.
   f' is undefined at $x = -1$ not diff.
   $f' = 0$ at $x = 3$ hor. tangent
   $f'' = 0$ for $x < -1$ constant slope
   $f'' < 0$ for $x > -1$ conc down.



x		−1		0		max 3	
f'(x)	+		+		+		−
f''(x)	0		−		−		−
f(x)	incr const. slope		incr c↓		incr c↓		decr c↓