

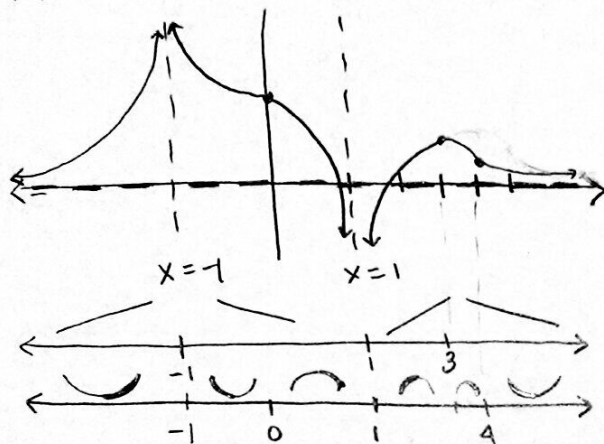
Quiz 18

November 10, 2016

Show all work and circle your final answer.

1. Given the following information, sketch a graph of $g(x)$.

- (a) There are vertical asymptotes at $x = -1$ and $x = 1$
- (b) There is a horizontal asymptote at $y = 0$
- (c) $g'(x) > 0$ on the intervals $(-\infty, -1) \cup (1, 3)$
- (d) $g'(x) < 0$ on the intervals $(-1, 1) \cup (3, \infty)$
- (e) $g''(x) > 0$ on the intervals $(-\infty, -1) \cup (-1, 0) \cup (4, \infty)$
- (f) $g''(x) < 0$ on the intervals $(0, 1) \cup (1, 4)$



2. Find the point on the graph of $y = x^3 + 3$ closest to the point $(0, 3)$.

$$d = \sqrt{(x-0)^2 + (y-3)^2}$$

$$d^2 = x^2 + (y-3)^2$$

$$d^2 = x^2 + (x^3+3-3)^2$$

$$d^2 = x^2 + x^6$$

$$\frac{dd^2}{dx} = 2x + 6x^5 \stackrel{\text{set}}{=} 0$$

$$2x(1+3x^4) = 0$$

$$\text{CP's : } x=0, x=\sqrt[4]{-1/3}$$

So the closest point is $\boxed{(0,3)}$.

Note: $(0,3)$ is actually on the graph of $y = x^3 + 3$.