KFUPM
Mathematics & Statistics

Term 161
MATH 101
Quiz# 1

Date: 5/10/2016
Duration: 15 minutes

Name: ID #: Section: 4 Serial #:

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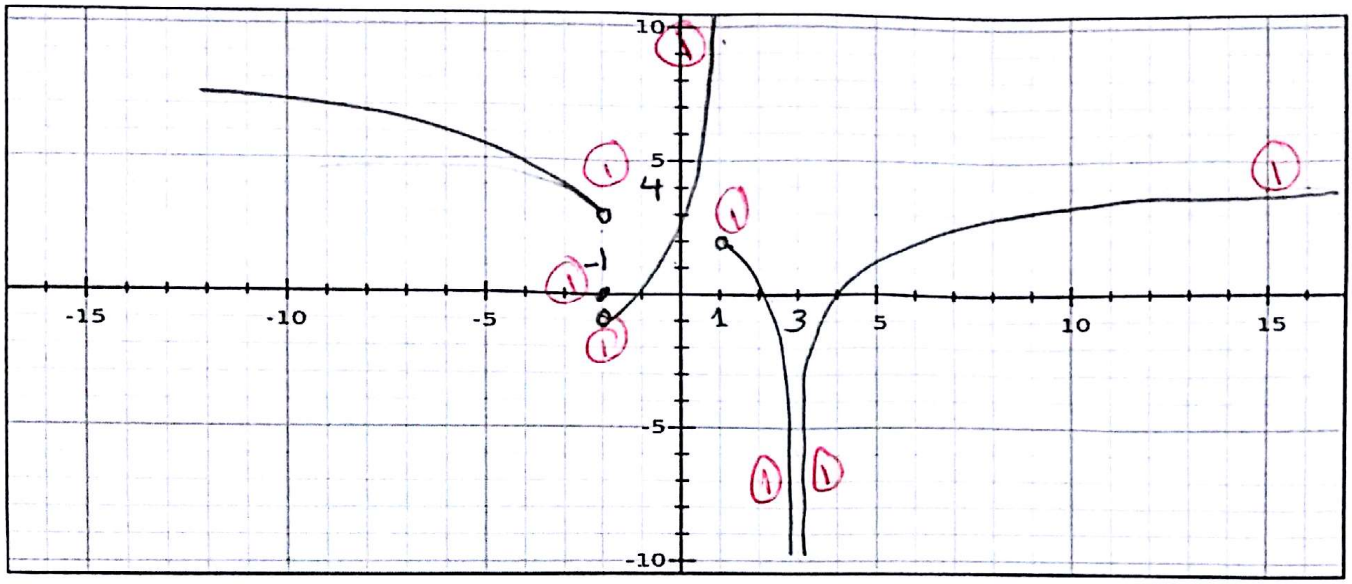
1. Using the grid below, sketch the graph of a function f that satisfies ALL the following $\lim_{x\to 1^-} f(x) = +\infty$, $\lim_{x\to 1^+} f(x) = 2$, $f(1)$ is undefined , $\lim_{x\to -2^-} f(x) = 3$, $\lim_{x\to -2^+} f(x) = -1$, $f(-2) = 0$, $\lim_{x\to 3} f(x) = -\infty$, $\lim_{x\to +\infty} f(x) = 4$.



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2. Evaluate $\lim_{x\to 0} x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right)$. Explain in detail.

Using (1) Squeeze Theorem:

$$-1 \le \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) \le 1$$

$$-x^3 \le x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) \le x^3 \quad (1)$$

$$\lim_{x\to 0^-}(-x^3) \le \lim_{x\to 0^-} x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) \le \lim_{x\to 0^-} x^3$$

$$0 \ge \lim_{x\to 0^-} x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) \ge 0 \quad (1)$$

$$\Rightarrow \lim_{x\to 0^-} x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) = 0 \quad (1)$$

$$\lim_{x\to 0^+}(-x^3) \le \lim_{x\to 0^+} x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) \le \lim_{x\to 0^+} x^3$$

$$0 \le \lim_{x\to 0^+} x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) \le 0 \quad (1)$$

$$\Rightarrow \lim_{x\to 0^+} x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) = 0 \quad (1)$$

$$\Rightarrow \lim_{x\to 0} x^3 \sin\left(\frac{\pi}{\sqrt[3]{x}}\right) = 0 \quad (1)$$

With My Best Wishes