MSLC – Math 1151
Exam 1 Review

Disclaimer: This review should NOT be used as your only guide for what to study.

1. Find the following limits:

a. $\lim\limits_{x\to 7^+} \dfrac{x^2-4x-21}{x^2-2x-35}$

b. $\lim\limits_{x\to 0^+} \dfrac{1}{1-e^{\sqrt{x}}}$

c. $\lim\limits_{x\to 6} \dfrac{|6-x|}{6-x}$

d. $\lim\limits_{x\to 0} \dfrac{\cos^2(x)-1}{\cos(x)-1}$

e. $\lim\limits_{x\to 1^-} e^{\frac{1}{x-1}}$

f. $\lim\limits_{t\to -2} \dfrac{7-t}{t^2-t-6}$

g. $\lim\limits_{x\to -\infty} \dfrac{2x^3-3x^2+4}{x^3+3x^2-1}$

h. $\lim\limits_{\theta\to\infty} \cos\theta$

i. $\lim\limits_{x\to -\infty} \dfrac{x^3}{\sqrt{4x^6-7}}$

j. $\lim\limits_{x\to 0} x^2 \sin\left(\frac{1}{x}\right)$

k. $\lim\limits_{x\to 3} \dfrac{2x-\sqrt{3x^2+2x+3}}{x-3}$

l. $\lim\limits_{x\to\infty} \left(2x-\sqrt{4x^2-x}\right)$

2. Let $f(x)=\dfrac{x^3-2x^2-5x+6}{x^2+x-2}$. Find all discontinuities. Find the limits at the places where $f(x)$ is discontinuous.

3. Let

$$f(x)=\begin{cases} \frac{12}{x-3} & x<-1 \\ x+2 & -1\le x\le 3 \\ a-x & 3<x \end{cases}$$

Find the following:

a. $f(-1)$

b. $f(3)$

c. $\lim\limits_{x\to 1} f(x)$

d. $\lim\limits_{x\to -1} f(x)$

e. What value must a have in order for $f(x)$ to be continuous at $x=3$?

4. Let $f(x)$ be the graph to the right. Find:

a) $\lim\limits_{x\to\infty} f(x)$

b) $\lim\limits_{x\to -\infty} f(x)$

c) $\lim\limits_{x\to -5} f(x)$

d) $\lim\limits_{x\to -2^-} f(x)$

e) $\lim\limits_{x\to -2^+} f(x)$

f) $\lim\limits_{x\to 3} f(x)$

g) $\lim\limits_{x\to 6^-} f(x)$

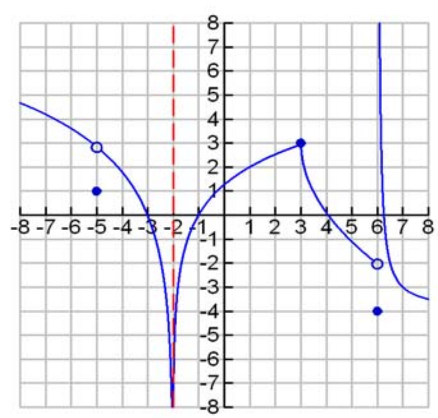
h) $\lim\limits_{x\to 6^+} f(x)$

i) $f(-5)$

j) $f(-2)$

k) $f(3)$

l) $f(6)$



5. Sketch a graph with the following properties:

$\lim\limits_{x\to\infty} f(x)=4,\quad \lim\limits_{x\to -\infty} f(x)=+\infty,\quad \lim\limits_{x\to 4^-} f(x)=\infty$

$\lim\limits_{x\to 4^+} f(x)=-\infty,\quad \lim\limits_{x\to -3^-} f(x)=5,\quad \lim\limits_{x\to -3^+} f(x)=-2$

6. Use the Intermediate Value Theorem to prove that there exists a positive number *c* such that $c^2=2$. (Hint: Let $f(x)=x^2$. Choose your endpoints to be $x=1$ and $x=2$.) Clearly state each condition of the Intermediate Value Theorem and why this set-up satisfies the condition.