APBC S.Hogan
Unit 1 Review

The topics on this review are similar to those found on the unit exam. Keep in mind that although the concepts will be the same, you may be required to apply them differently. In addition to this review, you should make sure that you are familiar with all material and formulae from this chapter.

Exam Format:

(1) 22 multiple-choice questions (some released AP, some not)
(2) 1 free-response question (non-AP)
(3) NO CALCULATORS
(4) You will NOT be penalized for wrong answers on the multiple-choice, so you should answer EVERY question.

Time Restrictions:

You will have 48 minutes to complete this examination. This means that you are being required to move at above AP pace (2 minutes per non-calculator multiple-choice and 15 minutes per free-response)

PLEASE COMPLETE THIS REVIEW SHEET IN ITS ENTIRETY BEFORE WE DO OUR IN-CLASS REVIEW. THAT IS THE BEST WAY TO PREPARE FOR THIS EXAM.

MULTIPLE-CHOICE: Choose the one answer that you believe is correct. 2 points each.	
1	Which of the following functions are continuous at $x=1$? I. $\ln x$ II. e^x III. $\ln(e^x-1)$ (A) I only (B) II only (C) I and II only (D) II and III only (E) I, II, and III
2	$\lim_{h\to 0}\frac{\sin(x+h)-\sin x}{h}$ is (A) 0 (B) 1 (C) $\sin x$ (D) $\cos x$ (E) nonexistent
3	$\lim_{x\to\infty}\left(1+5e^x\right)^{\frac{1}{x}}$ is (A) 0 (B) 1 (C) e (D) e^5 (E) nonexistent
4	If k is a positive integer, then $\lim_{x\to+\infty}\frac{x^k}{e^x}$ is (A) 0 (B) 1 (C) e (D) $k!$ (E) nonexistent

5	What is $\lim_{x\to 0}\frac{e^{2x}-1}{\tan x}$? (A) -1 (B) 0 (C) 1 (D) 2 (E) The limit does not exist.
6	$\lim_{x\to\frac{\pi}{4}}\frac{\sin\left(x-\frac{\pi}{4}\right)}{x-\frac{\pi}{4}}$ is (A) 0 (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{\pi}{4}$ (D) 1 (E) nonexistent
7	$\lim_{h\to 0}\frac{1}{h}\ln\left(\frac{2+h}{2}\right)$ is (A) e^2 (B) 1 (C) $\frac{1}{2}$ (D) 0 (E) nonexistent
8	$\lim_{h\to 0}\frac{\int_1^{1+h}\sqrt{x^5+8}\,dx}{h}$ is (A) 0 (B) 1 (C) 3 (D) $2\sqrt{2}$ (E) nonexistent
9	If $f(x)=2x^2+1$, then $\lim_{x\to 0}\frac{f(x)-f(0)}{x^2}$ is (A) 0 (B) 1 (C) 2 (D) 4 (E) nonexistent
10	Let f be the function given by $f(x)=\frac{(x-1)(x^2-4)}{x^2-a}$. For what positive values of a is f continuous for all real numbers x? (A) None (B) 1 only (C) 2 only (D) 4 only (E) 1 and 4 only

11	Evaluate the limit. $\lim_{x\to 3}(-x^3+4x^2-6)$ A. 3 B.13 C. -5 D. 7 E. None of the above
12	Evaluate the limit. $\lim_{x\to \pi}(-2\sec(2x))$ A. 2 B.$-2\sqrt{2}$ C. $-\frac{1}{2}$ D. -2 E. None of the above
13	Evaluate the limit. $\lim_{x\to -1} f(x),\ f(x)=\begin{cases}-\frac{x}{2}+\frac{1}{2}, & x<-1\\ 1, & x\geq -1\end{cases}$ A. 1 B. -6 C. -7 D. DNE E. None of the above
14	Evaluate the limit. $\lim_{x\to 2}\left(-\frac{3e^{\frac{1}{x-2}}}{e^{\frac{1}{x-2}}+1}-1\right)$ A. 4 B. -6 C. DNE D. -2 E. None of the above

15	Evaluate the limit. $\lim_{x\to 1} \frac{\sqrt{x}-1}{x-1}$ A. -5 B. 10/11 C. -7/6 D. 1/2 E. None of the above
16	Evaluate the limit. $\lim_{x\to 0} \frac{1-\cos x}{x}$ A. -2 B. 0 C. 1 D. 2 E. None of the above
17	Evaluate the limit. $\lim_{x\to -1} \frac{x+3}{x^2+2x+1}$ A. ∞ B.DNE C. -10 D. -∞ E. None of the above
18	Evaluate the limit. $\lim_{x\to \frac{\pi}{2}} 2\sec(x)$ A. -∞ B. ∞ C. 3 D. DNE E. None of the above

19	Evaluate the limit. $\lim_{x\to-\infty} \frac{\sqrt{4x^2+2}}{3x+2}$ A. 3/4 B. -∞ C. -2/3 D. ∞ E. None of the above
20	Evaluate the limit. $\lim_{x\to-\infty} \frac{x}{\sin(-x)}$ A. DNE. Oscillates. B. -∞ C. -2 D. ∞ E. None of the above
21	Determine if each function is continuous. If the function is not continuous, find the *x*-axis location of and classify each discontinuity. $f(x) = \frac{x-4}{x^2-x-6}$ A. Removable discontinuity at: x = 1 B. Continuous C. Non-Removable discontinuities at: x = -2, x = 3 D. Removable discontinuity at: x = -1 E. None of the above
22	Determine if each function is continuous. If the function is not continuous, find the *x*-axis location of and classify each discontinuity. $f(x) = \cos\frac{1}{x-\pi}$ A. Oscillating discontinuity at: x=π B. Oscillating discontinuity at: x=-2π C. Oscillating discontinuity at: x=3π D. Continuous E. None of the above

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FREE-RESPONSE: Evaluate each limit. You must show all work in order to receive full credit. (16 points)	
23A	$\lim_{x\to 3} f(x),\ f(x)=\begin{cases}\frac{x}{2}-\frac{3}{2}, & x\le 3\\ -x^2+4x-3, & x>3\end{cases}$
23B	$\lim_{x\to 3}\frac{x-3}{\sqrt{x-2}-1}$
23 C	$\lim_{x\to -1}\frac{2\lvert -x-1\rvert}{-x-1}$
23D	$\lim_{x\to 0}\frac{\frac{1}{-2+x}+\frac{1}{2}}{x}$