APBC S.Hogan
Unit 2 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.

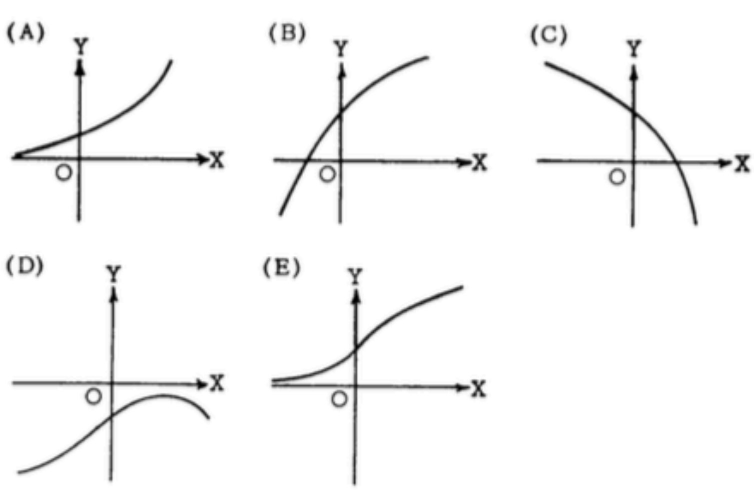
Exam Format:

(1) 16 multiple-choice questions
(2) 1 free-response question
(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 AP pace (2 minutes per non-calculator multiple-choice and 15 minutes for 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.

1	The position of a particle moving along the x-axis is $x(t)=\sin(2t)-\cos(3t)$ for time $t\geq 0$. When $t=\pi$, the acceleration of the particle is (A) 9 (B) $\frac{1}{9}$ (C) 0 (D) $-\frac{1}{9}$ (E) -9
2	If y is a function x such that $y'>0$ for all x and $y''<0$ for all x, which of the following could be part of the graph of $y=f(x)$? 

3	Let f be a function defined and continuous on the closed interval $[a,b]$. If f has a relative maximum at c and $a < c < b$, which of the following statements must be true? I. $f'(c)$ exists. II. If $f'(c)$ exists, then $f'(c)=0$. III. If $f''(c)$ exists, then $f''(c) \le 0$. (A) II only (B) III only (C) I and II only (D) I and III only (E) II and III only
4	The derivative of f is $x^4(x-2)(x+3)$. At how many points will the graph of f have a relative maximum? (A) None (B) One (C) Two (D) Three (E) Four
5	The graph of $y=5x^4-x^5$ has a point of inflection at (A) $(0,0)$ only (B) $(3,162)$ only (C) $(4,256)$ only (D) $(0,0)$ and $(3,162)$ (E) $(0,0)$ and $(4,256)$
6	The slope of the line tangent to the curve $y^2+(xy+1)^3=0$ at $(2,-1)$ is (A) $-\frac{3}{2}$ (B) $-\frac{3}{4}$ (C) 0 (D) $\frac{3}{4}$ (E) $\frac{3}{2}$
7	If c is the number that satisfies the conclusion of the Mean Value Theorem for $f(x)=x^3-2x^2$ on the interval $0 \le x \le 2$, then $c =$ (A) 0 (B) $\frac{1}{2}$ (C) 1 (D) $\frac{4}{3}$ (E) 2
8	For what non-negative value of b is the line given by $y=-\frac{1}{3}x+b$ normal to the curve $y=x^3$? (A) 0 (B) 1 (C) $\frac{4}{3}$ (D) $\frac{10}{3}$ (E) $\frac{10\sqrt{3}}{3}$
9	The point on the curve $x^2+2y=0$ that is nearest the point $\left(0,-\frac{1}{2}\right)$ occurs where y is (A) $\frac{1}{2}$ (B) 0 (C) $-\frac{1}{2}$ (D) -1 (E) none of the above

10	If $f(x)=\frac{x}{\tan x}$, then $f'\left(\frac{\pi}{4}\right)=$ (A) 2 (B) $\frac{1}{2}$ (C) $1+\frac{\pi}{2}$ (D) $\frac{\pi}{2}-1$ (E) $1-\frac{\pi}{2}$
11	If $y=x^2+2$ and $u=2x-1$, then $\frac{dy}{du}=$ (A) $\frac{2x^2-2x+4}{(2x-1)^2}$ (B) $6x^2-2x+4$ (C) x^2 (D) x (E) $\frac{1}{x}$
12	If $f(x)=\left(x^2+1\right)^x$, then $f'(x)=$ (A) $x\left(x^2+1\right)^{x-1}$ (B) $2x^2\left(x^2+1\right)^{x-1}$ (C) $x\ln\left(x^2+1\right)$ (D) $\ln\left(x^2+1\right)+\frac{2x^2}{x^2+1}$ (E) $\left(x^2+1\right)^x\left[\ln\left(x^2+1\right)+\frac{2x^2}{x^2+1}\right]$
13	If $f(x)=\ln(\ln x)$, then $f'(x)=$ (A) $\frac{1}{x}$ (B) $\frac{1}{\ln x}$ (C) $\frac{\ln x}{x}$ (D) x (E) $\frac{1}{x\ln x}$
14	If $y=\ln\left(x^2+y^2\right)$, then the value of $\frac{dy}{dx}$ at the point $(1,0)$ is (A) 0 (B) $\frac{1}{2}$ (C) 1 (D) 2 (E) undefined

15	If $y = x^{\ln x}$, then y' is (A) $\dfrac{x^{\ln x}\ln x}{x^2}$ (B) $x^{1/x}\ln x$ (C) $\dfrac{2x^{\ln x}\ln x}{x}$ (D) $\dfrac{x^{\ln x}\ln x}{x}$ (E) None of the above
16	If $y^2 - 2xy = 16$, then $\dfrac{dy}{dx} =$ (A) $\dfrac{x}{y-x}$ (B) $\dfrac{y}{x-y}$ (C) $\dfrac{y}{y-x}$ (D) $\dfrac{y}{2y-x}$ (E) $\dfrac{2y}{x-y}$
17 FR	Consider the curve defined by $-8x^2 + 5xy + y^3 = -149$. (a) Find $\dfrac{dy}{dx}$. (b) Write an equation for the line tangent to the curve at the point $(4, -1)$. (c) There is a number k so that the point $(4.2, k)$ is on the curve. Using the tangent line found in part (b), approximate the value of k. (d) Write an equation that can be solved to find the actual value of k so that the point $(4.2, k)$ is on the curve. (e) Solve the equation found in part (d) for the value of k.