AP Calculus AB
First Semester Review #2 **MULTIPLE CHOICE** **Name** Key **NO CALCULATOR!**

SHOW ALL WORK!! Indicate clearly the methods you use.

1) $\lim_{h\to 0} \frac{\cos\left(\frac{\pi}{2}+h\right)-\cos\left(\frac{\pi}{2}\right)}{h} =$

$f(x) = \cos x$
$f'(x) = -\sin x$
$f'\left(\frac{\pi}{2}\right) = -1$

a) $-\infty$

b) -1

c) 0

d) 1

e) $+\infty$

2) $\lim_{n\to\infty} \frac{3n^3-5n}{n^3-2n^2+1} =$

a) -5

b) -2

c) 1

d) 3

e) nonexistent

3) If the function f is continuous for all real numbers and if $f(x) = \frac{x^2-4}{x+2}$ when $x \neq -2$, then $f(-2) =$

$f(x) = \frac{(x+2)(x-2)}{x+2}$
$= (x-2)$

a) -4

b) -2

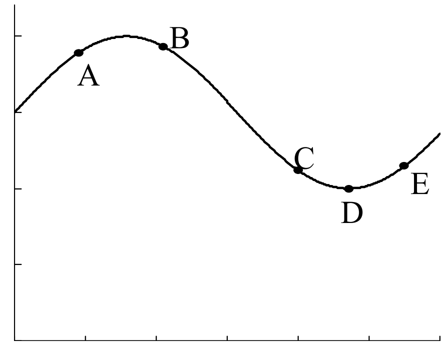
c) -1

d) 0

e) 2

4) At which of the five points on the graph in the figure at the right are $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ both negative?

$\downarrow$ cd



a) A   b) B   c) C   d) D   e) E

5) $\lim\limits_{\theta\to0}\dfrac{1-\cos\theta}{2\sin^2\theta}=$

a) 0

b) $\dfrac{1}{8}$

c) $\dfrac{1}{4}$

d) 1

e) nonexistent

When finding limits, step 1 is to substitute.

However, we get $\frac{0}{0}$!

So... use Algebra/Trig

$\lim\limits_{\theta\to0}\dfrac{1-\cos\theta}{2(1-\cos^2\theta)}$

$\lim\limits_{\theta\to0}\dfrac{1-\cos\theta}{2(1-\cos\theta)(1+\cos\theta)}$

$\lim\limits_{\theta\to0}\dfrac{1}{2(1+\cos\theta)}$

$\dfrac{1}{2(1+1)}$

6) If f is a differentiable function, then $f'(a)$ is given by which of the following?

T I. $\lim\limits_{h\to0}\dfrac{f(a+h)-f(a)}{h}$

T II. $\lim\limits_{x\to a}\dfrac{f(x)-f(a)}{x-a}$

F III. $\lim\limits_{x\to a}\dfrac{f(x+h)-f(x)}{h}$

a) I only   b) II only   c) I and II only   d) I and III only   e) I, II, and III

AP Calculus AB Name Key

First Semester Review **MULTIPLE CHOICE** **CALCULATOR ALLOWED**

SHOW ALL WORK!!

7) If $x^3 + 3xy + 2y^3 = 17$, then in terms of x and y, $\frac{dy}{dx} =$

a) $-\frac{x^2+y}{x+2y^2}$

b) $-\frac{x^2+y}{x+y^2}$

c) $-\frac{x^2+y}{x+2y}$

d) $-\frac{x^2+y}{2y^2}$

e) $\frac{-x^2}{1+2y^2}$

$$3x^2 + 3x\frac{dy}{dx} + y \cdot 3 + 6y^2\frac{dy}{dx} = 0$$

$$\frac{dy}{dx}(3x + 6y^2) = -3x^2 - 3y$$

$$\frac{dy}{dx} = \frac{-3(x^2+y)}{3(x+2y^2)}$$

8) The equation of the line tangent to the graph of $y = \frac{2x+3}{3x-2}$ at the point (1, 5) is

a) $13x - y = 8$

b) $13x + y = 18$

c) $x - 13y = 64$

d) $x + 13y = 66$

e) $-2x + 3y = 13$

$$\frac{dy}{dx} = \frac{(3x-2)2 - (2x+3)3}{(3x-2)^2}$$

$$= \frac{6x - 4 - 6x - 9}{(3x-2)^2}$$

$$= \frac{-13}{(3x-2)^2}$$

$$\left.\frac{dy}{dx}\right|_{(1,5)} = -13$$

$$y - 5 = -13(x-1)$$

$$y = -13x + 13 + 5$$

$$13x + y = 18$$

9) If $y = \tan x - \cot x$, then $\frac{dy}{dx} =$

a) $\sec x \cdot \csc x$

b) $\sec x - \csc x$

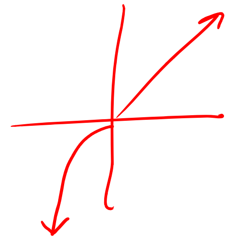
c) $\sec x + \csc x$

d) $\sec^2 x - \csc^2 x$

e) $\sec^2 x + \csc^2 x$

10) Let f be the function defined by $f(x)=\begin{cases} x^3 & \text{for } x \le 0 \\ x & \text{for } x > 0 \end{cases}$.

Which of the following statements about f is true?



a) f is an odd function F

b) f is discontinuous at x = 0 F

c) f has a relative maximum F

d) $f'(0)=0$ F

e) $f'(x)>0$ for $x \neq 0$ T

11) $\lim\limits_{x\to 0}\dfrac{\sin 2x}{x\cos x} = \lim\limits_{x\to 0}\left(\dfrac{\sin 2x}{2x}\cdot\dfrac{2}{\cos x}\right)$

$1 \cdot \frac{2}{1}$

a) 0

b) 1

c) $\frac{1}{2}$

d) 2

e) Does not exist