Uncommon Schools | Change History.

AP Calculus AB

Q1 Interim Assessment

October 2015

Section I – Part A (45 Minutes)

NO Calculators Allowed

Student Name: _____

Teacher: _____

SECTION I – PART A DIRECTIONS

45 Minutes: 22 Multiple Choice *(1 point each)*

Solve each of the following problems, using the available space for scratch work. After examining the form of the choices, decide which is the best of the choices given and fill in the corresponding bubble on the answer sheet. No credit will be given for anything written in the test book. You may not use a calculator.

In this test:

(1) Unless otherwise specified, the domain of a function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

(2) The inverse of a trigonometric function f may be indicated using the inverse function notation f^{-1} or with the prefix "arc" (e.g., $\sin^{-1} x = \arcsin x$).

1. If $f(x) = \cos^2(5-x)$, then $f'(2) =$

(A) $-2\cos 3$

(B) $-2\sin 3\cos 3$

(C) $10\cos 3$

(D) $2\sin 3\cos 3$

(E) $10\sin 3\cos 3$

2. Let *f* be the function defined by the following:

$$f(x) = \begin{cases} \sin x & x < 0 \\ x^2 & 0 \le x < 1 \\ 2 - x & 1 \le x < 2 \\ x - 1 & x \ge 2 \end{cases}$$

For what values of *x* is *f* NOT continuous?

(A) 0 only (B) 1 only (C) 2 only (D) 0 and 2 only (E) 0, 1, and 2

3. $\lim_{x\to 5}\dfrac{x^2-25}{x^2+5x-50}$ **is**

(A) $-\dfrac{2}{3}$ (B) 0 (C) $\dfrac{2}{3}$ (D) 1 (E) Nonexistent

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4. If $f(x)=\ln\left(\sqrt{x}\right)$**, then** $f''(x)=$

(A) $-\dfrac{2}{x^2}$ (B) $-\dfrac{1}{2x^2}$ (C) $-\dfrac{1}{2x}$ (D) $-\dfrac{1}{2x^{3/2}}$ (E) $\dfrac{2}{x^2}$

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5. $\lim_{x\to 10}\dfrac{e^{x+5}-e^{15}}{x-10}=$

(A) 0

(B) 1

(C) e^{10}

(D) e^{15}

(E) Nonexistent

6. What is the slope of the line tangent to the curve $3y^2 - 2x^2 = 6 - 2xy$ at point (3, 2)?

(A) 0 (B) $\frac{4}{9}$ (C) $\frac{7}{9}$ (D) $\frac{6}{7}$ (E) $\frac{5}{3}$

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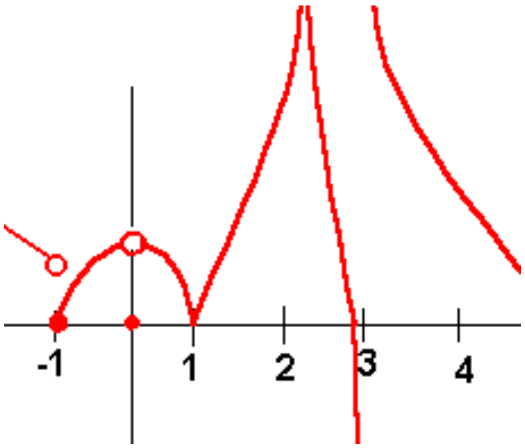
7. The graph of a function *f* is shown below. At which value of *x* is *f* continuous, but not differentiable?



(A) -1 (B) 0 (C) 1 (D) 3 (E) 4

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8. $\lim_{x \to 0} \frac{\sin x - \sin x \cos x}{x^2}$ is

(A) Nonexistent (B) – 1 (C) 0 (D) 1 (E) ∞

9. $\lim_{x\to\infty}\dfrac{(x-3)(2x-2)}{(6-x)(x-1)}$

(A) -2 (B) -1 (C) 0 (D) 1 (E) ∞

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10. The instantaneous rate of change of the function $f(x)=\dfrac{x^2-2x}{x-1}$ **at** $x = 3$ **is**

(A) $-\dfrac{5}{2}$ (B) $-\dfrac{5}{4}$ (C) $\dfrac{5}{4}$ (D) $\dfrac{5}{2}$ (E) 4

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11. What is $\lim_{h\to 0}\dfrac{\csc\left(\frac{\pi}{4}+h\right)-\csc\left(\frac{\pi}{4}\right)}{h}$**?**

(A) –2 (B) $-\sqrt{2}$ (C) –1 (D) $\sqrt{2}$ (E) Undefined

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12. Let $f(x)=4x-2$ **and** $g(x)=x^3$**. Find** $\lim_{x\to 1} g\big(f(x)\big)$**.**

(A) 2 (B) 1 (C) 8 (D) –8 (E) –4

13. If the function *f* is continuous for all real numbers and if $f(x)=\frac{x^2-10x+24}{x-6}$ when $x \neq 6$, then $f(6)=$

(A) 0 (B) 2 (C) 6 (D) 12 (E) D.N.E.

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14. If $\ln(2x+y)=x+1$, then $\frac{dy}{dx}=$

(A) –2

(B) $2x+y-2$

(C) $2x+y$

(D) $4x+2y-2$

(E) $y-\frac{y}{x}$

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15. The table gives values of *f*, *f'*, *g*, and *g'* at selected values of *x*. If $h(x)=f(g(x))$, then $h'(3)=$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-2	4	2	1	-4
1	-2	-4	3	6
3	1	10	-2	3

(A) -17 (B) 2 (C) 4 (D) 6 (E) 10

16. If $y = \sin^{-1}(5x)$**, then** $\frac{dy}{dx} =$

(A) $\frac{1}{1+25x^2}$ (B) $\frac{5}{1+25x^2}$ (C) $\frac{-5}{\sqrt{1-25x^2}}$ (D) $\frac{1}{\sqrt{1-25x^2}}$ (E) $\frac{5}{\sqrt{1-25x^2}}$

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17. If $f(x) = x^2 \sin 2x$**, find** $f'(x)$**.**

(A) $2x\cos 2x$

(B) $4x\cos 2x$

(C) $2x(\sin 2x + \cos 2x)$

(D) $2x(\sin 2x - x\cos 2x)$

(E) $2x(\sin 2x + x\cos 2x)$

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18. Let *f* be the function defined by $f(x) = 2x^3 - 8x + 6$**. Which of the following is the equation of the line normal to the graph of *f* at the point where *x* = –1?**

(A) $y = -2x - 2$

(B) $y = -2x + 10$

(C) $y = \frac{1}{2}x - 2$

(D) $y = \frac{1}{2}x + 10$

(E) $y = \frac{1}{2}x + 12.5$

19. If $f(x)=\sec(2x)$, then $f'(x)=$

(A) $\tan^2(2x)$

(B) $2\tan^2(2x)$

(C) $\tan(2x)\sec(2x)$

(D) $2\tan(2x)\sec(2x)$

(E) $-2\sin(2x)\sec^2(2x)$

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20. The function *f* is defined below. For what value of *k*, if any, is *f* continuous at *x* = 2?

$$f(x)=\begin{cases} x^2-3x+9 & x\le 2 \\ kx+1 & x>2 \end{cases}$$

(A) 1 (B) 2 (C) 3 (D) 7 (E) 0

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21. If $f(x)=\dfrac{x}{\tan x}$, then $f'\left(\dfrac{\pi}{4}\right)=$

(A) 2

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

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

(D) $\dfrac{\pi}{2}-1$

(E) $1-\dfrac{\pi}{2}$

22. If $f(x) = (x^5 + 1)^3$ **, then** $\frac{dy}{dx} =$

(A) $(5x^4)^3$

(B) $3(x^5 + 1)$

(C) $3(5x^4 + 1)$

(D) $5x^4(x^5 + 1)^2$

(E) $15x^4(x^5 + 1)^2$

END OF SECTION I – PART A

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS PART ONLY.
DO NOT GO ON TO PART B UNTIL YOU ARE TOLD TO DO SO.