AP Calculus
Multiple Choice Monday #1

Name: Key
Date: ____________ Per: ____

Problem	Section Name
1. Find the second derivative of $x^2y = 2$. (A) $\frac{6y}{x^2}$ (B) $\frac{x^2}{y}$ (C) $\frac{y}{x^2}$ (D) $-\frac{6y}{x^2}$ (E) $-\frac{x^2}{6y}$ 1st $x^2 \quad y$ $2x \quad \frac{dy}{dx}$ $2xy + x^2\frac{dy}{dx} = 0$ $\frac{dy}{dx} = \frac{-2xy}{x^2} = \frac{-2y}{x}$ 2nd $-2y \quad x$ $-2\frac{dy}{dx} \quad 1$ $\frac{d}{dx}\left[\frac{d}{dx}\right] = \frac{-2\left(\frac{-2y}{x}\right)x - (-2y)}{(x)^2} = \frac{4y+2y}{x^2} = \frac{6y}{x^2}$	9
2. If $\frac{dy}{dx} = -x\cos(x^2)$ and $y = 2$ when $x = 0$, then a solution to the differential equation is (A) $y = -\frac{1}{2}\sin(x^2)$ (B) $y = -\frac{1}{2}(\cos x)^2 + 2$ (C) $y = -\frac{1}{2}(\sin x)^2 + 2$ (D) $y = -\frac{1}{2}\cos(x^2) + 2$ (E) $y = -\frac{1}{2}\sin(x^2) + 2$ $\int dy = \int -x\cos(x^2)\,dx$ $u = x^2$ $du = 2x\,dx$ $x\,dx = \frac{1}{2}du$ $y = -\frac{1}{2}\int \cos(u)\,du$ $y = -\frac{1}{2}\sin(x)^2 + C \longrightarrow y = -\frac{1}{2}\sin(x^2) + 2$ $2 = -\frac{1}{2}\sin(0) + C$ $\rightarrow C = 2$	29
3. $\lim_{h\to 0}\frac{2x^2+4xh+2h^2-2x^2}{h}$ (A) 4 (B) $3x^2$ (C) $2x^2$ (D) $4x$ (E) $6x$ $\lim_{h\to 0}\frac{(4x+2h)\cancel{h}}{\cancel{h}} = \lim_{h\to 0} 4x+2h = 4x$	3
4. $\int 18x^2\sec^2(3x^3)\,dx =$ (A) $2\tan^2(3x^3) + C$ (B) $2\cot^2(3x^3) + C$ (C) $\cot(3x^3) + C$ (D) $\tan(3x^3) + C$ (E) $2\tan(3x^3) + C$ $u = 3x^3$ $du = 9x^2\,dx$ $2\int \sec^2(u)\,du$ $= 2\tan(u) + C$ $= 2\tan(3x^3) + C$	27, 28

5. Find $\frac{dy}{dx}$ if $2y^2 - 6y = x^4 + 2x^3 - 2x - 5$ at $(1,1)$ 9

(A) -1 (B) -2 (C) -3 (D) -4 (E) -5

$$4y\frac{dy}{dx} - 6\frac{dy}{dx} = 4x^3 + 6x^2 - 2$$

$$\frac{dy}{dx} = \frac{4x^3+6x^2-2}{4y-6}\Bigg|_{(1,1)} = \frac{4(1)^3+6(1)^2-2}{4(1)-6} = \frac{8}{-2} = -4$$

6. Is the function $f(x) = \begin{cases} x^3 - 3, & x < 3 \\ 2x + 7, & x \geq 3 \end{cases}$ continuous at $x = 3$? If not, what is the discontinuity? 5

(A) The function is continuous (B) Point (C) Essential (D) Jump (E) Removable

no issue w/ x^3-3 or $2x+7$, thus only boundary problem

$(3)^3 - 3 = 24$ $(3, 24)$ jumps to

$2(3) + 7 = 13$ $(3, 13)$

*7. $\int_0^{\frac{\pi}{4}} \sin x \, dx + \int_{-\frac{\pi}{4}}^{0} \cos x \, dx =$ Use calc to solve 22

(A) $-\sqrt{2}$ (B) -1 (C) 0 (D) 1 (E) $\sqrt{2}$

*8. If $f(x) = 3x^2 - x$ and $g(x) = f^{-1}(x)$, then $g'(10)$ could be 10

(A) 59 (B) $\frac{1}{59}$ (C) $\frac{1}{10}$ (D) 11 (E) $\frac{1}{11}$

$g(10) = ?$

$f(?) = 10$

$g'(10) = \frac{1}{f'(?)}$

1. Solve$(10 = 3x^2 - x, x)$ $x = \frac{-5}{3}, 2$

2. $\frac{d}{dx}(3x^2 - x) \mid x = -5/3$ $x = -11$

or

$\frac{d}{dx}(3x^2 - x) \mid x = 2$ $\boxed{x = 11}$

*9. The graph of $y = x^3 - 2x^2 - 5x + 2$ has a local minimum at 15

(A) $(2.120, 0)$ (B) $(2.120, -8.061)$ (C) $(-0.786, 0)$ (D) $(-0.786, 4.209)$ (E) $(0.666, -1.926)$

graph $f1(x) = x^3 - 2x^2 - 5x + 2$

menu → analyze → min