AP Calculus
Multiple Choice Monday #3

Name: Key
Date: ____________ Per: ____

Problem	Section Name
1. Find $\lim_{x\to\infty} 3xe^{-3x}$ (A) $\frac{1}{3}$ (B) 3 (C) -1 (D) 1 (E) 0 $\lim_{x\to\infty} \frac{3x}{e^{3x}}$ den > num HA → 0	4
2. $\int x^2 \sin(3x^3+2)\ dx$ (A) $-9\cos(3x^2+2)+C$ (B) $-\cos(3x^2+2)+C$ (C) $-\frac{\cos(3x^2+2)}{9}+C$ (D) $\frac{\cos(3x^2+2)}{9}+C$ (E) $9\cos(3x^2+2)+C$ $\frac{1}{9}\int \sin(u)\,du$ $u=3x^3+2$ $du=9x^2\,dx$ $=\frac{-1}{9}\cos(3x^3+2)+C$ $x^2dx=\frac{1}{9}du$	27
3. Find $\frac{dy}{dx}$ if $y=\log_3(2x^3+4x^2)$ (A) $\frac{6x^2+8x}{(x^2+2x)\ln 3}$ (B) $\frac{3x+4}{(2x^3+4x^2)\ln 3}$ (C) $\frac{3x+4}{(x^2+2x)\ln 3}$ (D) $\frac{3x+4}{3\ln(x^2+2x)}$ (E) $\frac{6x^2+8x}{(3x^3+2x^2)\ln 3}$ $u=2x^3+4x^2$ $du=6x^2+8x$ $y'=\frac{6x^2+8x}{(2x^3+4x^2)\ln 3}=\frac{2\cancel{x}(3x+4)}{2\cancel{x}(x^2+2x)\ln 3}$	7
4. Verify whether $f(x)=3x^2-12x+1$ satisfies Rolle's Theorem on the interval $[0,4]$ and find all the numbers c that satisfy $f'(c)=0$. (A) $c=0$ (B) $c=1$ (C) $c=2$ (D) $c=4$ (E) No such value exists $0=f'(c)=\frac{f(b)-f(a)}{b-c}$ $f'(c)=6c-12$ $f(4)=1$ $f(0)=1$ $6c-12=\frac{1-1}{4}=0$ $6c=12$ $c=2$	14
5. $\int \frac{\ln^3 x}{x}\,dx=$ (A) $\frac{\ln^3 x}{3}+C$ (B) $\frac{\ln^4 x}{4}+C$ (C) $\frac{\ln^5 x}{5}+C$ (D) $\ln^3 x+C$ (E) $\ln^4 x+C$ $u=\ln x$ $du=\frac{1}{x}dx$ $\int u^3\,du$ $=\frac{(\ln x)^4}{4}+C$ $*\ \ln^a x=(\ln x)^a$	27

$\neq \ln x^a$

<table>
<tr><td>6. $\lim_{x\to\infty} \frac{5x^2-3x+1}{4x^2+2x+5}$
(A) 0 (B) $\frac{4}{5}$ (C) $\frac{3}{11}$ (D) $\frac{5}{4}$ (E) ∞

num = den use ratio

HA → $\frac{5}{4}$</td><td>5</td></tr>
<tr><td>$y=0x+3$
*7. Which point on the curve $y = 5x^3 - 12x^2 - 12x + 64$ has a tangent line parallel to $y = 3$?
(A) $(0,-2)$ (B) $(2,32)$ (C) $\left(\frac{2}{5},12\right)$ (D) $\left(-2,\frac{288}{25}\right)$ (E) $\left(\frac{2}{5},\frac{256}{25}\right)$

Same slope
m = 0
der = 0

Solve $\left(\frac{d}{dx}(5x^3-12x^2-12x+64)=0, x\right)$

$x=2$</td><td>7</td></tr>
<tr><td>*8. Find the distance traveled in the first four seconds, for a particle whose velocity is given by $v(t) = 7e^{-t^2}$, where t represents time.
(A) 0.976 (B) 6.204 (C) 6.359 (D) 12.720 (E) 7.000

Calc
$\int_0^4 7e^{-t^2}\,dt =$</td><td>26</td></tr>
<tr><td>*9. Find two non-negative numbers x and y whose sum is 100 and for which x^2y is a maximum.
(A) $x = 33.333$ and $y = 33.333$ (B) $x = 50$ and $y = 50$ (C) $x = 33.333$ and $y = 66.667$
(D) $x = 100$ and $y = 0$ (E) $x = 66.667$ and $y = 33.333$

$x+y=100 \rightarrow y=100-x$

$f1(x) = x^2y$
$= x^2(100-x)$
$= 100x^2 - x^3$

find max
</td><td>18</td></tr>
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$f'(x) = 200x - 3x^2$

$= x(200-3x)$

$x = 0, \frac{200}{3}$

f: dec, inc, dec

f'(x): −, +, −

0, $\frac{200}{3} = x$