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AP Calculus AB - Practice Spot Check/Quiz - 1.2 Finding Limits Graphically and Numerically

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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2017

AP Calculus AB - Practice Spot Check/Quiz - 1.3 Evaluating Limits Analytically

1. $\lim_{x\to 1} \frac{x^2+x+2}{x+1}$

$\lim_{x\to 1} \frac{(1)^2+(1)+2}{1+1} = \frac{4}{2} = 2$

2. Let $\lim_{x\to 8} f(x)=-5$ and $\lim_{x\to 8} g(x)=10$. Find the $\lim_{x\to 8} [\frac{f(x)}{g(x)}]$

(C) $-\frac{1}{2}$

$\lim_{x\to 8} \frac{-5}{10} = -\frac{1}{2}$

3. Find the $\lim_{x\to 2} [f(x)+4g(x)]$ if the $\lim_{x\to 2} f(x)=4$ and the $\lim_{x\to 2} g(x)= \frac{1}{2}$ and describe what happens to the graph as x approaches 2?

$\lim_{x\to 2} 4 + 4*(\frac{1}{2}) = 6$

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AP Calculus AB - Practice Spot Check/Quiz - 1.4 Continuity and One-Sided Limits

1. Question

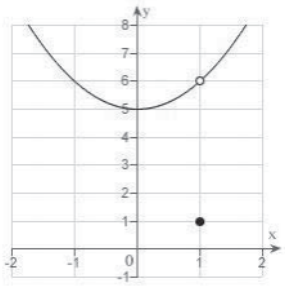
Lim $_{x\to 2^+}$ $\frac{x^2+2x+-8}{x^2-4}$ =

$\frac{(2.01)^2+2(2.01)-8}{(2.01)^2-4}$ = 1.5

2. Question

Question Use the graph of $y = f(x)$ to evaluate the indicated limit or function value or state that it does not exist.

$\lim_{x\to 1^-} f(x)$

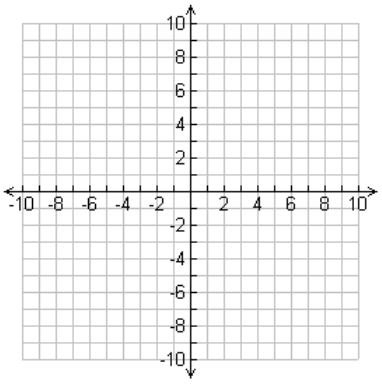


(A) 6

As f(x) approaches 1 from the left, the limit is 6(the hole). Answer B would be the answer to f(1)=1, because that is where it exists.

3. Question 3

Sketch the graph of a function f that satisfies the following conditions: $\lim_{x\to 0^-} f(x) = 1$, $\lim_{x\to 0^+} f(x) = 0$, $f(0) = 1$.



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AP Calculus AB - Practice Spot Check/Quiz - 1.5 Infinite Limits

1. For f(x) = $\frac{3}{x-2}$, find the limit as x approaches 2 from the left and the right

$$\lim_{x\to 2^-} \frac{3}{x-2} = -\infty$$

$$\lim_{x\to 2^+} \frac{3}{x-2} = \infty$$

2. Find the limit as $\lim_{x\to\infty} \frac{x^3-11x^2+18x}{x^2-9x}$

(A) ∞

(B) $-\infty$

(C) DNE

(D) None of these

3. Determine all vertical asymptotes and points of discontinuities of the graph of f(x)= $\frac{x^2+2x-8}{x^2-4}$

f(x)= $\frac{x^2+2x-8}{x^2-4} = \frac{(x+4)(x-2)}{(x+2)(x-2)} = \frac{x+4}{x+2}$, $x \neq 2$

There is a vertical asymptote at x=-2 and a point of discontinuity at x=2

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AP Calculus AB - Practice Spot Check/Quiz - 2.1 The Derivative and the Tangent Line Problem

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

Name: _____ Date: _____ Pd: ___
2017

AP Calculus AB - Practice Spot Check/Quiz - 2.2 Basic Differentiation Rules and Rate of Change

1. $\frac{d}{dx}[5x^2 + 3x^3 - 2x]$

$10x + 9x^2 - 2$

2.

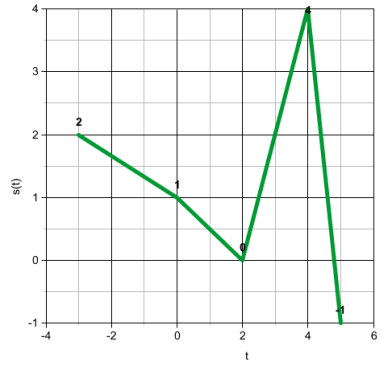
t (sec)	0	10	20	30	40
V(t) m/sec	11.8	14.6	21.3	25.2	28.9

Given the above data find an approximation for V'(25) and use the correct units in your answer

(D) 0.390 $\frac{meter}{sec^2}$

$\frac{v(30)-v(20)}{30-20} = \frac{3.9m/s}{10s} = 0.390\ \frac{meter}{sec^2}$

3. Given the following graph of s(t), find s'(1)



$\frac{1-0}{0-1} = \frac{1}{-1} = -1$

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AP Calculus AB - Practice Spot Check/Quiz - 2.3 Product and Quotient Rules and Higher Order

1. Question

Product Rule : $f(x)*g'(x) + g(x)*f'(x)$

$f(x) = x^3 \cos(x)$

$f'(x) = x^3(-\sin x) + \cos x(3x^2)$

$= 3x^2\cos(x) - x^3\sin(x)$

$= x^2(3\cos(x) - x\sin(x))$

2. Question

$\frac{\sin(x)}{x^3}$

(A) $\frac{x\cos x - 3\sin x}{x^4}$

Quotient rule : $\frac{f'(x)*g(x) + g'(x)*f(x)}{g(x)^2}$

$\frac{x^3\cos x - \sin x(3x^2)}{(x^3)^2} = \frac{x\cos x - 3\sin x}{x^4}$

3. Question

$\frac{d}{dx}[f(x)g(x)h(x)] =$

$= \frac{d}{dx}[f(x) * g(x)]h(x) + f(x)g(x)h'(x)$

$= [f(x)g'(x) + g(x)f'(x)]\ h(x) + f(x)g(x)h'(x)$

$= f'(x)g(x)h(x) + f(x)g'(x)h(x) + f(x)g(x)h'(x)$

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AP Calculus AB - Practice Spot Check/Quiz - 2.4 Chain Rule

1. $\frac{d}{dx}\left[\tan^2(3x)\right]$

$\tan(3x)^2$

$2\tan(3x) * \sec^2(3x) * 3$

$6\tan(3x) * \sec^2(3x)$

2. $\frac{d}{dx}\left[\cot(x) - \sqrt{3-x}\right]$

(A) $-\csc^2(x)$ - $\frac{1}{2\sqrt{3-x}}$

(B) $-\csc^2(x)$ + $\frac{1}{2\sqrt{3-x}}$

(C) $\csc^2(x)$ - $\frac{1}{2\sqrt{3-x}}$

(D) $\csc^2(x)$ + $\frac{1}{2\sqrt{3-x}}$

3. Evaluate the derivative of the function f(x)= $\sqrt[5]{3x^3+4x}$ at the point (2,2).

$\sqrt[5]{3x^3+4x}$

$(3x^3+4x)^{\frac{1}{5}}$

$f'(x) = \frac{1}{5}(3x^3+4x)^{-\frac{4}{5}} * (9x^2+4) = \frac{9x^2+4}{5(3x^3+4x)^{\frac{4}{5}}}$

$f'(2) = \frac{40}{80} = \frac{1}{2}$

$2 = \frac{1}{2}(2) + b$

$y = \frac{1}{2}x + 1$

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AP Calculus AB - Practice Spot Check/Quiz - 2.5 Implicit Differentiation

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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AP Calculus AB - Practice Spot Check/Quiz - 2.6 Related Rates

1. A spherical balloon is inflating so that the radius is inflating so that the radius is increasing at a rate of 0.5 cm/sec. How fast is the volume of the balloon changing when the radius of the balloon is 12 cm?

V= $\frac{4}{3}\pi r^3$ $\frac{dr}{dt}$ =0.5 cm/sec r=12 cm

$\frac{dV}{dt}$ =4 πr^2 $\frac{dr}{dt}$

$\frac{dV}{dt}$ =4 $\pi(12cm)^2$ 0.5 cm/sec

$\frac{dV}{dt} = 288\,\pi\ cm^3/sec$

2. A conical tank is 15 meters tall and has a radius of 10 meters. It is releasing water so that the water level is decreasing at a rate of ¼ meters/sec. What is the change of volume of the tank?

(D) $-\frac{100\pi}{9}\ \frac{meters^3}{sec}$

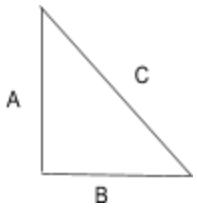
V= $\frac{1}{3}\pi r^2 h$ $\frac{dh}{dt}$ =-¼ m/s h (at end)=10 $\frac{15}{10}=\frac{h}{r}$

15r=10h r= $\frac{2}{3}$ h V= $\frac{1}{3}\pi(\frac{2}{3}h)^2$ h V= $\frac{4\pi}{27}h^3$

$\frac{dV}{dt}$ = $\frac{12\pi}{27}(h)^2$ $\frac{dh}{dt}$

$\frac{dV}{dt} = -\frac{100\pi}{9}$

3. A ladder that is c feet long rests against a vertical wall. If the bottom of the ladder slides away from the wall at a rate of $\frac{db}{dt}$ then write out using variables how fast is the top of the ladder sliding down the wall when the bottom of the ladder is a feet from the wall?



$C^2 = A^2 + B^2$ $\frac{dC}{dt}$ =0 2C $\frac{dC}{dt}$ = 2A $\frac{dA}{dt}$ +2B $\frac{db}{dt}$ 0=2A $\frac{dA}{dt}$ +2B $\frac{db}{dt}$ $\frac{dA}{dt} = \frac{-2B\frac{db}{dt}}{2A}$

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AP Calculus AB - Practice Spot Check/Quiz - 3.1 Extrema on the Interval

1. Question

Find the extrema of on the closed interval [-1 , 2]
f ' (x)= $12x^3-12x^2$
Step 1 Critical Numbers
$12x^3-12x^2=0$
$12x^2(x-1)=0$
$12x^2=0$ $(x-1)=0$
x=0 x=1

2. Question
Let f be known at a . If f ' (a) = 0 or if f isnt differentiable at a , then a is a C.V of f.

(B)true

The critical numbers of a function need not produce relative extrema, critical numbers are usually where the graph changes.

3. Question

Sketch the graph of f and locate the absolute extrema over the interval [1, 5].

$$f(x) = \begin{cases} 2 - x2 , & 1 \le x < 3 \\ 2 - 3x, & 3 \le x \le 5 \end{cases}$$

Critical number x=3
Absolute max of 1 at x=1
Absolute min of -13 at x=5

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AP Calculus AB - Practice Spot Check/Quiz - 3.2 Mean Value Theorem

1. Let f(x)= $x^3 - 4x + 5$ and let c be the number that satisfies the MVT for f on the interval $[-2, 4]$. What is c?

$f'(c) = \frac{f(4)-f(-2)}{(4)-(-2)}$

$3x^2 - 4 = \frac{53-5}{6}$

$3x^2 - 4 = 8$

$x = 2, \ -2$

$x = 2$ *because* -2 *is an endpoint, meaning it is not inside of the interval*

2. Determine all the numbers c which satisfy the conclusions of the MVT for the function f(x)= $x^3 + 2x^2 - x$ on the interval $[-1, 2]$.

(A) -4 $\pm \frac{\sqrt{76}}{6}$

(B) -4+ $\frac{\sqrt{76}}{6}$

(C) -4 - $\frac{\sqrt{76}}{6}$

(D) None of them

3. Suppose that we know that f(x) is continuous and differentiable on $[6, 15]$. Let's also suppose that we know that f(6)= -2 and f'(x) ≤ 10. What is the largest possible value for f(15)?

$f'(c) = \frac{f(15)-f(6)}{15-6}$

$f(15) - f(6) = f'(c)(15 - 6)$

$f(15) = f(6) + f'(c)(15 - 6) = -2 + 9f'(c)$

$f(15) = -2 + 9f'(c)$

$f(15) \leq -2 + (9)10 = 88$

Largest possible value is 88

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AP Calculus AB - Practice Spot Check/Quiz - 3.3 INC/DEC Functions and the First Deriv. Test

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

Name: _____ Date: _____ Pd: ___
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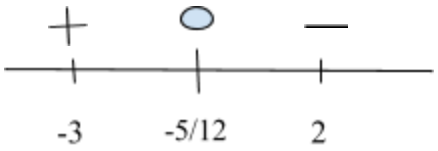
AP Calculus AB - Practice Spot Check/Quiz - 3.4 Concavity and the Second Deriv. Test

1. Given the function $y = 5x^2 - 4x^3 + 10$, find the point of inflection

$\frac{dy}{dx} = 10x - 12x^2$ $\frac{d^2y}{dx^2} = 10 - 24x$ x= $-\frac{5}{12}$

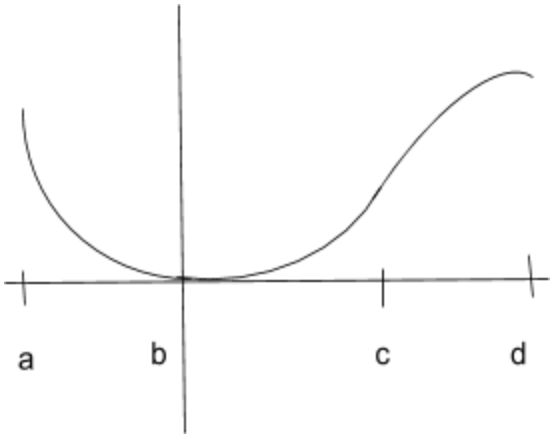


2.2. Given the function y= $-3x^3 - 8x + 10$, determine where the function is concave down

(A) x> $-\frac{2}{3}$

$\frac{dy}{dx} = -6x^2 - 8x$ $\frac{d^2y}{dx^2} = -12x - 8$ x= $-\frac{2}{3}$

3. Given the following graph what letter represents the point of inflection?



Answer: C

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AP Calculus AB - Practice Spot Check/Quiz - 3.5 Limits at Infinity

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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AP Calculus AB - Practice Spot Check/Quiz - 3.6 A Summary of Curve Sketching

1. For the function f(x)= $\frac{2(x^2-1)}{x^2-4}$, find the domain, range, intercepts, critical values, and inflection points.

$Domain: \ x \neq \pm 2$

$Range: \ (-\infty,-2) \ U \ (-2,2) \ U \ (2,\infty)$

$X-intercept: \ x = \pm \sqrt{1}$

$Y-intercept: \ \frac{1}{2}$

$Critical \ Value: x \neq \pm 2$

$No \ points \ of \ inflection$

2. What are the critical values of y= $x^4 - 3x^2$ on the interval $[0,8]$

(A) x=0, $\sqrt{\frac{3}{2}}$, - $\sqrt{\frac{3}{2}}$

(B) x= – $\sqrt{\frac{3}{2}}$

(C) x= 0

(D) x= $\sqrt{\frac{3}{2}}$

3. $Sketch \ the \ graph \ y = x^3 - 3x - 2$

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AP Calculus AB - Practice Spot Check/Quiz - 3.7 Optimization Problems

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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AP Calculus AB - Practice Spot Check/Quiz - 3.9 Differentials

1. Find the equation of the tangent line to the graph of v(x)= $5x^2 + 10$ if you are given the point $(\frac{1}{2}, 4)$

$\frac{dv}{dx}$ =10x slope=10($\frac{1}{2}$)= 5

y-4=5(x- $\frac{1}{2}$)

2. What is the value of dy if x=2 and Δx is equal to -.03, given the function $y = 4x^2 + 5x$

(A) -0.630

$\frac{dv}{dx}$ =8x+5

dy=8x+5 dx

dy=8(2)+5 dx

dy=21(-.03)

dy= -0.630

3. Approximate the possible error of the area of a square calculus textbook, with a side length of 22 cm and a possible error of 0.02 cm.

$A = s^2$

$\frac{dA}{dt} = 2s$

$dA = 2s\, ds$

$dA = 2\ (22)\ (0.2)$

$dA = 0.880$

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AP Calculus AB - Practice Spot Check/Quiz - 4.1 Antiderivatives and Indefinite Integration

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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AP Calculus AB - Practice Spot Check/Quiz - 4.2 Area

1. Find the area between the intervals of the x-axis of the given equation $27x^3 - 5x^2 - 14x$ between the intervals [1,5]

$\int 27x^3 - 5x^2 - 14x = \frac{27x^4}{4} - \frac{5x^3}{3} - 7x^2$

$\int_1^5 27x^3 - 5x^2 - 14x = \left[\frac{27(5)^4}{4} - \frac{5(5)^3}{3} - 7(5)^2\right] - \left[\frac{27(1)^4}{4} - \frac{5(1)^3}{3} - 7(1)^2\right]$

A=3837.333

2. Find the area of the region that lies under the curve y= $15x^3 + 9x^2 - 4x$ from -2 to 2

(A) -48

(B) 56

(C) 48

(D) -56

3. Given $\int_0^5 f(x)dx = 8,\ \int_4^5 f(x)dx = 2,\ \int_0^6 g(x)dx = 15, \int_6^5 g(x)dx = -4,\ \int_4^5 g(x)dx = 6$, what is $\int_0^4 (f(x) + g(x))dx$?

$\int_0^5 f(x)dx - \int_4^5 f(x)dx = \int_0^4 f(x)dx$ = 8-2=6

$\int_0^4 g(x)dx + \int_4^5 g(x)dx + \int_5^6 g(x)dx = \int_0^6 g(x) = \int_0^4 g(x)dx$ +6+4=15

$\int_0^4 g(x)dx$ =5

$\int_0^4 g(x)dx$ +6=11

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AP Calculus AB - Practice Spot Check/Quiz - 4.3 Riemann Sums and Definite Integrals

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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2017

AP Calculus AB - Practice Spot Check/Quiz - 4.4 The Fundamental Theorem of Calculus

1. Given $g(x)= \int_1^x 3x^3 - 5x^2 \, dx$, find $g'(4)$

$\frac{3}{4} x^4 - \frac{5}{3}x^3$

$(\frac{3}{4}(4)^4 - \frac{5}{3}(4)^3) - (\frac{3}{4}(1)^4 - \frac{5}{3}(1)^3) = \int_1^x 3x^3 - 5x^2 \, dx$

$86.25 = 86.25$

2. Given $v(x)= \int_0^x sin(x) + cos(x) \, dx$, find $v'(\pi)$

C) 2

$\int_0^\pi sin(x) + cos(x) \, dx = ((-\cos(\pi) + \sin(\pi)) - (-\cos(0) + \sin(0))$

$2=2$

3. Given the following function $f(x)= \int_1^b g'(x) \, dx$ write out how you would solve for f'(b)

$g(b) - g(1) = \int_1^b g'(x) \, dx$

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AP Calculus AB - Practice Spot Check/Quiz - 4.5 Integration by Substitution

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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AP Calculus AB - Practice Spot Check/Quiz - 4.6 Numerical Integration (Trapezoidal)

1. Find the area under the curve using the trapezoidal rule using the function $f(x) = \sqrt{2x-1}$ $[1,6]$

$\Delta x = 1$

$\frac{f(1)+f(2)}{2}\Delta x + \frac{f(2)+f(3)}{2}\Delta x + \frac{f(3)+f(4)}{2}\triangle x + \frac{f(4)+f(5)}{2}\triangle x + \frac{f(5)+f(6)}{2}\triangle x$

$\frac{\triangle x}{2}(f(1)+2f(2)+2f(3)+2f(4)+2f(5)+f(6))$

$\frac{1}{2}(1+2\sqrt{3}+2\sqrt{5}+2\sqrt{7}+6+2\sqrt{11})$

A=13.430

2. Find the area under the curve using the trapezoidal rule using the function $f(x) = 4x^2 + 5x - 1$ $[1,3]$

(A) 108

(B) 56

(C) 54

(D) 70.5

3. Approximate the area between the curve $f(x) = x^3 - x + 1$ and the x-axis on the interval [0, 2] using 4 rectangles and the Trapezoidal Rule

$\frac{1}{4}$ [1+7+2(0.625+1+2.875)]

4.25

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AP Calculus AB - Practice Spot Check/Quiz - 5.1 The Natural Logarithmic: Differentiation

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

Name: _____ Date: _____ Pd: ___
2017

AP Calculus AB - Practice Spot Check/Quiz - 5.2 The Natural Logarithmic Function: Integration

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

Name: _____ Date: _____ Pd: ___
2017

AP Calculus AB - Practice Spot Check/Quiz - 5.4 Exponential: Differentiation and Integration

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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AP Calculus AB - Practice Spot Check/Quiz - 5.5 Bases other than e and Applications

1. $\frac{d}{dx}[7^x e^x]$

$7^x e^x + e^x 7^x ln7$

2. $\frac{d}{dx}\left[ln\left(5^{2x} - e^{3x}\right)\right]$

(A) $5^{2x} 2ln5 - 3e^{3x}$

(B) $\frac{1}{5^{2x} - e^{3x}}$

(C) $5^{2x} - e^{3x}$

(D) $\frac{5^{2x} 2ln5 - 3e^{3x}}{5^{2x} - e^{3x}}$

3. Find $\frac{dy}{dx}$ of $y = x^{sin(x)}$

$ln(y) = ln(x)^{sin(x)}$
$ln(y) = (sin(x))ln(x)$
$\frac{d}{dx}[ln(y)] = \frac{d}{dx}[sin(x)ln(x)]$
$\frac{1}{y}\frac{dy}{dx} = (cos(x))ln(x) + (sin(x))\frac{1}{x}$
$\frac{dy}{dx} = y[(cos(x))ln(x) + \frac{(sin(x))}{x}]$

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AP Calculus AB - Practice Spot Check/Quiz - 5.6 Inverse Trigonometric: Differentiation

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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AP Calculus AB - Practice Spot Check/Quiz - 5.7 Inverse Trigonometric: Integration

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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2017

AP Calculus AB - Practice Spot Check/Quiz - 6.2 Differential Equations: Growth/ Decay/ Logistic

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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2017

AP Calculus AB - Practice Spot Check/Quiz - 6.3 Differential Equations: Separation of Variables

1. Find the solution of $2xy' - ln(x)^2 = 0,\ y(1) = 2$

$\frac{dy}{dx} = \frac{2ln(x)}{2x} = \frac{ln(x)}{x}$

$dy = \frac{ln(x)}{x}dx$

$\int dy = \int \frac{ln(x)}{x}dx \quad u = ln(x) \quad du = \frac{1}{x}dx$

$\int u\,du = \frac{u^2}{2} + c$

$y = \frac{(ln(x)^2)}{2} + c$

$y = \frac{(ln(1)^2)}{2} + c$

$y = \frac{(ln(x)^2)}{2} + 2$

2. $\frac{dy}{dx} = \frac{2x}{y}$

(A) $\pm\sqrt{2x^2 + C}$

(B) $-\sqrt{2x^2 + C}$

(C) $\sqrt{2x^2 + C}$

(D) None of them

3. In 1955, a tree had a radius of 5 feet. In 1970, it has a radius of 6.2 feet. How much did the area change?

$A = \Pi r^2$

$\frac{dA}{dr} = 2\Pi r$

$dA = 2\Pi r\,dr$

$dA = 2\Pi(5)(1.2)$

$dA = 12\Pi$

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AP Calculus AB - Practice Spot Check/Quiz - 7.1 Area of a Region Between Two Curves

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

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AP Calculus AB - Practice Spot Check/Quiz - 7.2 Supplement - Volume: By Cross-Sections

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

Name: _____ Date: _____ Pd: ___

2017

AP Calculus AB - Practice Spot Check/Quiz - 7.2 Supplement - Volume: The Disk and Washer Method

1. Question

2. Question

(A)

(B)

(C)

(D)

3. Question

Name: _____ Date: _____ Pd: ___

2017

AP Calculus AB - Practice Spot Check/Quiz - 8.7 Indeterminate Forms and L'Hopitals Rule

1. $\lim_{x\to 0} \frac{1-cos(x)}{x^2}$

$\frac{1-cos(0)}{(0)^2} = \frac{0}{0}$

$\frac{d}{dx}\left[\frac{1-cos(x)}{x^2}\right]$

$\lim_{x\to 0} \frac{sin(x)}{2x}$

$\frac{sin(0)}{2(0)} = \frac{0}{0}$

$\frac{d}{dx}\left[\frac{sin(x)}{2x}\right]$

$\lim_{x\to 0} \frac{cos(x)}{2}$

$\frac{cos(0)}{2} = \frac{1}{2}$

2. $\lim_{x\to 2} \frac{\sqrt{2+x}-2}{x-2}$

(A) $\frac{1}{4}$

(B) $\frac{\sqrt{2}-2}{-2}$

(C) 2

(D) $\frac{1}{2}$

3. Explain the steps needed to solve a limit equation using L'Hopital's Rule

Sub in x=c into the function

If $\lim_{x\to c} \frac{f(x)}{g(x)} = \frac{0}{0}$, then $\lim_{x\to c} \frac{f'(x)}{g'(x)} = L$

Repeat until the answer is no longer $\frac{0}{0}$