More on rules of derivatives
By: Designing team

Name: Carlos Humberto Bárcenas González Id: A01570142 Date: 26/09/19

1. If $f(5)=1$, $f'(5)=6$, $g(5)=-3$, $g'(5)=2$. Find the values of

a) $(f\cdot g)'(5) = f(5)g'(5)+f'(5)g(5) = (1)(2)+(6)(-3) = 2-18 = -16$

b) $(f/g)'(5) = \frac{g(5)f'(5)-f(5)g'(5)}{g(5)^2} = \frac{(-3)(6)-(1)(2)}{(-3)^2} = \frac{-18-2}{9} = \frac{-20}{9}$

c) $(g/f)'(5) = \frac{1(2)+(-3)(6)}{1^2} = 20$

2. If $f(3)=4$, $g(3)=2$, $f'(3)=-6$ and $g'(3)=5$, find the following values

a) $(f+g)'(3) = -6+5 = -1$

b) $(f\cdot g)'(3) = (2)(-6)+(4)(5) = -12+20 = 8$

c) $(f/g)'(3)$ $\frac{(2)(-6)-(4)(5)}{2^2} = \frac{-12-20}{4} = \frac{-32}{4} = -8$

3. If $h(x)=f(x)g(x)$, use the table to find $h'(-1)$, $h'(0)$ and $h'(1)$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	0	5

$h'(-1) = g(-1)f'(-1)+f(-1)g'(-1) = (1)(1)+(2)(2) = \boxed{5}$

$h'(0) = g(0)f'(0)+f(0)g'(0) = \boxed{3}$

$h'(1) = g(1)f'(1)+f(1)g'(1) = \boxed{10}$

4. If $h(x)=f(x)/g(x)$, use the table to find $h'(-1)$, $h'(0)$ and $h'(1)$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	2	5

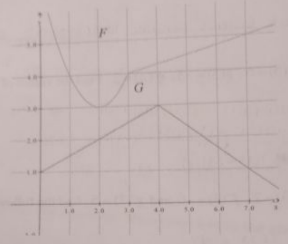
$h'(-1) = \frac{g(-1)f'(-1)-f(-1)g'(-1)}{g(-1)^2} = \frac{(1)(1)-(2)(2)}{-1^2} = \frac{1+3}{1} = \boxed{3}$

$\frac{g(0)f'(0)-f(0)g'(0)}{g(0)^2} = -1(0)-(-1)(3) = \frac{0+3}{1} = \boxed{3}$

$h'(1) = \frac{g(1)f'(1)-f(1)g'(0)}{g(1)^2} = \frac{(2)(-1)-(2)(5)}{4} = \frac{-2-10}{4} = \frac{-12}{4} = \boxed{-3}$

5. Considering that $P(x)=F(x)G(x)$ y $Q(x)=F(x)/G(x)$, where F and G are functions whose graphs are shown below.

a) Find $P'(2)$ b) Find $Q'(7)$



$F(2)=3$, $F'(2)=0$, $G(2)=2$, $G'(2)=\frac{1}{2}$

a) $3(\frac{1}{2})+2(0) = \boxed{\frac{3}{2}}$

$F(7)=5$, $F'(7)=1/4$, $G(7)=1$, $G'(7)=-2/3$

$\frac{(1)(1/4)-(5)(-2/3)}{1^2} = \frac{\frac{1}{4}+\frac{10}{3}}{1} = \boxed{\frac{43}{12}}$

6. Consider that $h(x)=f(g(x))$, find $h'(-1)$, $h'(0)$ and $h'(1)$ — $f'(g(x))g'(x)$

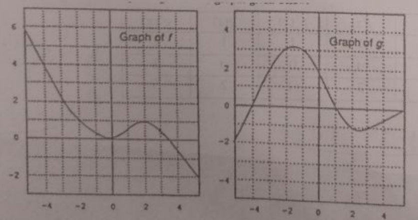
x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	0	5

$h'(-1)$: $g(-1)=1$, $h(x)=f(1)$, $f(1)=2$, $f'(1)=-1$, $g'(-1)=2$; $f'(g(x))\,g'(x) = (-1)(2) = \boxed{-2}$

$h'(0)$: $g(0)=-1$, $h(x)=f(-1)$, $f(-1)=2$, $f'(-1)=1$, $g'(0)=3$; $f'(g(x))\,g'(x) = (1)(3) = \boxed{3}$

$h'(1)$: $g(1)=0$, $h(x)=f(0)$, $f(0)=-1$, $f'(0)=0$, $g'(1)=5$; $f'(g(x))\,g'(x)$ = 0 · 5 = $\boxed{0}$

7. Consider that $h(x)=f(g(x))$, where f and g are functions whose graphs are shown below.



$g(-2)=3$, $f(3)=.5$, $f'(3)=$, $h(-2)=.5$

$g(3)=-1$, $f(-1)=.25$, $h(3)=.25$

a) Evaluate $h(-2)$ and $h(3)$

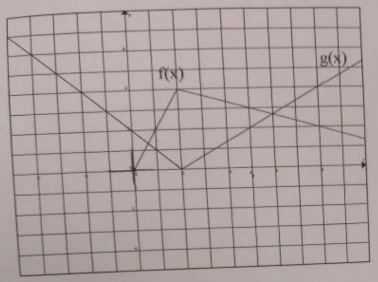
b) Is $h'(-3)$ positive, negative or zero? Explain your answer. zero

c) Is $h'(-1)$ positive, negative or zero? Explain your answer. negative

$g(-1)=3$ $(-)(-)$ = positive

8. If $f(x)$ and $g(x)$ are the functions whose graphs are shown, let $u(x)=f(x)\cdot g(x)$ and $v(t)=f(x)/g(x)$

a) Find $u'(1)$ b) Find $v'(5)$



$f(5)=3$, $f'(5)=-1/3$, $g(5)=2$, $g'(5)=2/3$

$\frac{2(-1/3)-3(2/3)}{2^2} = \frac{-2/3-2}{4} = \boxed{-2/3}$

Rules of Differentiation- Product & Quotient Rule practice
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Find the derivative of the following functions: BOX YOUR FINAL ANSWER

1) $f(x) = 4x^3(2x+5)^4$ $\boxed{f'(x) = (2x+5)^4 12x^2 + 32x^3(2x+5)^3}$

$u = 4x^3$ $u' = 12x^2$ $v = (2x+5)^4$ $v' = 4(2x+5)^3(2) = 8(2x+5)^3$

2) $f(x) = 2x\sqrt{(4x-2)^5}$ $f'(x) = (4x-2)^{5/2}(2) + (2x)(5/2)(4x-2)^{3/2}$ $\boxed{f'(x) = 2(4x-2)^{5/2} + (4x-2)^{3/2}}$

3) $f(x) = (4x+1)^3(3-x^2)^4$ $\boxed{f'(x) = (3-x^2)^4(12(4x+1)^2) + (4x+1)^3(-8x(3-x^2)^3)}$

$u = (4x+1)^3$ $v = (3-x^2)^4$ $u' = 12(4x+1)^2$ $v' = -8x(3-x^2)^3$

4) $f(x) = x^3(x^2+1)^4$ $f'(x) = (x^2+1)^4(3x^2) + (x^3)(8x(x^2+1)^3)$ $\boxed{f'(x) = (x^2+1)^4(3x^2) + 8x^4(x^2+1)^3}$

$u = x^3$ $v = (x^2+1)^4$ $u' = 3x^2$ $v' = 4(x^2+1)^3(2x) = 8x(x^2+1)^3$

5) $f(x) = (\frac{x}{2}+1)^8(x^2-3)^4$ $\boxed{4(x^2-3)^4(x/2+1)^7 + 8x(x/2+1)^8(x^2-3)^3}$

6) $f(x) = \frac{3x^2}{2}(2x-3)^4$ $\boxed{3x(2x-3)^4 + 12x^2(2x-3)^3}$

$u = \frac{3x^2}{2}$ $u' = 3x$ $v = (2x-3)^4$ $v' = 8(2x-3)^3$

7) $f(x) = \frac{(2x-1)^3}{2x^3}$ $f'(x) = \frac{(2x^3)(6(2x-1)^2) - (2x-1)^3(6x^2)}{(2x^3)^2} = \boxed{\frac{12x^3(2x-1)^2 - (2x-1)^3(6x^2)}{4x^6}}$

$u = (2x-1)^3$ $v = 2x^3$ $u' = 3(2x-1)^2(2) = 6(2x-1)^2$ $v' = 6x^2$

8) $f(x) = \frac{2x^2}{(x^2+1)^5}$ $\boxed{\frac{(x^2+1)^5(4x) - (2x^2)(10x(x^2+1)^4)}{[(x^2+1)^5]^2}}$ $\boxed{\frac{4x(x^2+1)^5 - 20x^3(x^2+1)^4}{(x^2+1)^{10}}}$

$v' = 5(x^2+1)^4(2x) = 10x(x^2+1)^4$

9) $f(x) = \frac{8x}{x+1}$ $\frac{(x+1)(8) - (8x)(1)}{(x+1)^2} = \boxed{\frac{8(x+1) - 8x}{(x+1)^2}}$

10) $f(x) = \frac{(2x-3)^4}{1-2x}$ $\frac{(1-2x)(8(2x-3)^3) - (2x-3)^4(-2)}{(1-2x)^2}$ $\boxed{\frac{8(1-2x)(2x-3)^3 + 2(2x-3)^4}{(1-2x)^2}}$

11) $f(x) = -\frac{x^2}{(2x+1)^5}$ $\frac{-2x(2x+1)^5 - (-x^2)(10(2x+1)^4)}{((2x+1)^5)^2} = \boxed{\frac{-2x(2x+1)^5 + 10x^2(2x+1)^4}{(2x+1)^{10}}}$

12) $f(x) = \frac{(x^3+1)^8}{(1-3x)^4}$ $\boxed{f'(x) = \frac{(1-3x)^4(24x^2(x^3+1)^7) - (x^3+1)^8(-12(1-3x)^3)}{((1-3x)^4)^2}}$

$u = (x^3+1)^8$ $v = (1-3x)^4$ $u' = 8(x^3+1)^7(3x^2) = 24x^2(x^3+1)^7$ $v' = 4(1-3x)^3(-3) = -12(1-3x)^3$

13) Find the equation of tangent line to the given function at the indicated point:

$f(x) = x(2x-3)^4$ at $x = 1$

$(2x-3)^4(1) + (8(2x-3)^3)(x)$

$(2x-3)^4 + 8x(2x-3)^3$

$(2(1)-3)^4 + 8(1)(2(1)-3)^3$

$(2-3)^4 + 8(2-3)^3 = \boxed{-7}$

14) Find the equation of tangent line to the given function at the indicated point:

$f(x) = \frac{(2x-1)^5}{x}$ at $x = 1$

$\frac{10x(2x-1)^4 - (2x-1)^5}{x^2}$

$\frac{x(10(2x-1)^4) - (2x-1)^5(1)}{x^2}$

$\frac{10(1)(2(1)-1)^4 - (2(1)-1)^5}{1^2} = \frac{10(2-1)^4 - (2-1)^5}{1}$

$\frac{x(10(2x-1)^4) - (2x-1)^5(1)}{1^2} = 253$

$u = (2x-1)^5$ $v = x$ $u' = 5(2x-1)^4(2) = 10(2x-1)^4$ $v' = 1$

$\frac{10x(2x-1)^4 - (2x-1)^5}{1^2} = \frac{10(1)(2(1)-1)^4 - (2(1)-1)^5}{1} =$

$\frac{10(2-1)^4 - (2-1)^5}{1} = \boxed{9}$

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(1) $(2x+5)^4(12x^2) + 32x^3(2x+5)^3$

$(2x+5)^3[(2x+5)(12x^2) + 32x^3]$

$4x^2(2x+5)^3[(2x+5)3 + 8x]$

(3) $(3-x^2)^4(12(4x+1)^2) + (4x+1)^3(-8x(3-x^2)^3)$

$(3-x^2)^3[(3-x^2)12(4x+1)^2 + (4x+1)^3 - 8x]$

$(4x+1)^2(3-x^2)^3[(3-x^2)12 + (4x+1) - 8x]$

$4(4x+1)^2(3-x^2)^3[(3-x^2)3 + (4x+1)(-2x)]$

(4) $(x^2+1)^4(3x^2) + 8x^4(x^2+1)^3$

$(x^2+1)^3[(x^2+1)(3x^2) + 8x^4]$

$x^2(x^2+1)^3[(x^2+1)(3) + 8x^2]$

(5) $4(x^2-3)^4(x/2+1)^7 + 8x(x/2+1)^8(x^2-3)^3$

$(x/2+1)^7(x^2-3)^3[4(x^2-3) + 8x(x/2+1)]$

$4(x/2+1)^7(x^2-3)^3[(x^2-3) + 2x(x/2+1)]$

(6) $3x(2x-3)^4 + 12x^2(2x-3)^3$

$3x(2x-3)^3[(2x-3) + 4x]$

(7) $\frac{12x^3(2x+1)^2 - (2x-1)^3(6x^2)}{4x^6}$

$2x^2(2x+1)^2\left[\frac{6x - 2(x-1)(3)}{2x^4}\right]$

(8) $3x(2x-3)^4 + 12x^2(2x-3)^3$

$3x(2x-3)^3[(2x-3) + 4x]$

(9) $\frac{8(x+1) - 8x}{(x+1)^2}$

$8(x+1)\left[\frac{-8}{x+1}\right]$

(10) $\frac{8(1-2x)(2x-3)^3 + 2(2x-3)^4}{(1-2x)^2}$

$2(1-2x)(2x-3)^3\left[\frac{4 + (2x-3}{(1-2x)}\right.$

(11) $\frac{-2x(2x+1)^5 + 10x^2(2x+1)^4}{(2x+1)^{10}}$

$-2x(2x+1)^4\left[\frac{(2x+1) + 5x}{(2x+1)^6}\right]$

(12) $\frac{(1-3x)^4 24x^2(x^3+1)^7 - (x^3+1}{(1-3x)^8}$

$24x^2(1-3x)^3(x^3+1)^7\left[\frac{(1-3x) - (x^3}{(1-3x)^5}\right.$

(13) $(2x-3)^4 + 8x(2x-3)^3$

$8x(2x-3)^3[(2x-3)]$

(14) $\frac{10x(2x-1)^4 - (2x-1)^5}{1^2}$

$10x(2x-1)^4\left[\frac{-(2x-1)}{1^2}\right]$

Rules of Differentiation- The Natural Logarithm Function

Selected by: Ing. Rosario I. González Canales
Reference: Taylor, Claudia D. y Gilligan, Lawrence. Applied Calculus. 4th edition. Pacific Grove: Brooks/Cole, 1996

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You must remember the following rule:

$$\boxed{\frac{d(\ln x)}{dx}=\frac{1}{x} \quad \text{or} \quad \frac{d[Ln(u)]}{dx}=\frac{1}{u}\frac{du}{dx}=\frac{u'}{u}}$$

I. Find the derivative for each of the following functions, frame your final answer.

1. $y=\frac{Ln2x}{Ln\,3x}$ $\frac{\frac{1}{x}\ln(3x)-\frac{1}{x}\ln(2x)}{\ln(3x)^2} = \boxed{\frac{\ln(3/2)}{x\ln^2(3x)}}$	2. $f(x)=\sqrt{1+Lnx}$ $f(x)=(1+\ln x)^{1/2}$ $f'(x)=\frac{1}{2}(1+\ln x)^{-1/2}\left(\frac{1}{x}\right)$ $\boxed{f'(x)=\frac{1}{2x\sqrt{1+\ln x}}}$
3. $h(x)=Ln(e^x)$ $\ln(e^x)$ $\boxed{h'(x)=1}$	4. $g(x)=x^2+Lnx$ $\boxed{g'(x)=2x+1/x}$
5. $y=\frac{Lnx}{x^2+1}$ $u=\ln x$ $u'=1/x$ $v=x^2+1$ $v'=2x$ $\frac{(x^2+1)(1/x)-(\ln x)(2x)}{(x^2+1)^2}=\boxed{\frac{1/x+2x\ln x}{x^2+1}}$	6.

II. Solve the following exercises, remember to show your procedure

1. The demand for a certain article is given by $p=50-10Lnx$, where x represents the price of the article and $x\geq 1$. Determine the rate of change of the demand with respect of the price.

$p'=50-10\left(\frac{1}{x}\right)$

$p'=-\frac{10}{x}$

2. The revenue by selling "x" hundreds of articles is given by $R(x)=60\sqrt{\ln x}$, where $x\geq 1$ and R is measured in hundreds of dollars. Find the marginal revenue for 400 items.

$R(x)=60(\ln x)^{1/2}$

$30(\ln x)^{-1/2}\left(\frac{1}{x}\right)$

$\frac{30}{400\sqrt{\ln 400}}=0.0306$

$R'(x)=\frac{30}{x\sqrt{\ln x}}=$

OK

Rules of Differentiation- Exponential Functions

By:

Ing Ziad Najjar

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Find the derivative of the following functions: **BOX YOUR ANSWER**

$$\boxed{If\ \ f(x)=e^U\ \ then\ \ f'(x)=U'e^U}$$

1) $y=\frac{3}{e^{2x^2}}$ $y=3e^{-2x^2}$ $\boxed{y'=\frac{-12x}{e^{2x^2}}}$	2) $y=\frac{e^{x^2}}{2x}$ $u=e^{x^2}$ $u'=2xe^{x^2}$ $v=2x$ $v'=2$ $\frac{(2x)(2xe^{x^2})-(e^{x^2})(2)}{2x^2}$ $\boxed{y'=\frac{4x^2e^{x^2}-2e^{x^2}}{4x^2}}$
3) $y=e^{3x}(2x-1)^4$ PRODUCT AND CHAIN RULE $4e^{3x}(2x-1)^4(2)$ $e^{3x}(4(2x-1)^3(2))+(2x-1)^4(3e^{3x})$ $8e^{3x}(2x-1)^3$ $\boxed{y'=24e^{3x}(2x-1)^3}$	4) $f(x)=\frac{e^{2x}}{6}+2x^5$ $u=e^{2x}$ $u'=2e^{2x}$ $v=6$ $v'=0$ $\frac{1}{6}e^{2x}+2x^5$ $\frac{6(2e^{2x})-(e^{2x})(0)}{36}$ $\frac{12e^{2x}}{36}$ $\boxed{y'=\frac{1}{3}e^{2x}+10x^4}$
5) $f(x)=e^{(x^2+3x)^4}$ $u=(x^2+3x)^4$ $u'=4(x^2+3x)(2x+3)$ $u'=4(2x+3)(x^2+3x)$ $f'(x)=(8x+12)(x^2+3x)^3e^{(x^2+3x)^4}$	

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Prepa Tec

Calculus I 2nd partial

Quiz # 2A

80

Name [illegible] Mat. [illegible]

I. Determine if true or false for each of the following statements (5 points each)

1. T The derivative of $y = 6 - e^{-x}$ is $y' = e^{-x}$ $\quad -e^{-x} \quad +1e^{-x}$

2. F The derivative of $y = \frac{1}{2}Ln(x-4)^{3/2}$ is $y' = \frac{3}{4}Ln(x-4)^{1/2}$

$U = (x-4)^{3/2} \quad U' = \frac{3}{2}(x-4)^{1/2}$

3. T If $s(t)$ is the function of position of an object in motion, then $a(t) = s''(t)$ is equal to the function of the acceleration of the object.

4. T If the velocity of the car is a function of time, then the derivative of this function with respect to time, describes the acceleration of the car.

$-3x^{-2}$

II. Circle the right answer. (10 point each) $\quad 3x^{-1}$

1. (C) The derivative for $y = 2e^{3/x}$ is:

A) $y' = 2e^{3/x}$ B) $y' = 2e^{3}$ C) $y' = -\frac{6e^{3/x}}{x^2}$ D) $y' = 6x^2e^{3/x}$

2. (C) The derivative for $y = Ln\sqrt{2x-4}$ is: $\quad Ln(2x-4)^{1/2}$

A) $y' = \frac{1}{2x-4}$ B) $y' = \frac{1}{2}Ln(2x-4)^{-1/2}$ $\quad \frac{(2x-4)^{1/2}}{(2x-4)}$ $\quad (2x-4)^{-1/2}$

C) $y' = \frac{1}{2}Ln\frac{2}{\sqrt{2x-4}}$ D) $y' = \frac{1}{x-2}$ $\quad \frac{1}{2}(2x-4)^{-1/2}(2)$

3. (C) If the equation that gives the velocity of an object is $v(t) = 2t^3e^{6t}$, then the equation that gives the acceleration is: $\quad 6t^2(6)e^{6t}$

A) $a(t) = 6t^2e^{6t}(2t+1)$ B) $a(t) = 6t^2e^{6t}$

C) $a(t) = 36t^2e^{6t}$ D) $a(t) = 12t^3e^{6t}$

$6t^2\,6e^{6t}$

$(2t^3)(6e^{6t}) + e^{6t}(6t^2)$

$12t^3e^{6t} + 6t^2e^{6t}$

$6t^2e^6(2t+1)$

III. Answer the following questions.

1) Find the SLOPE of the line tangent to $y = \frac{e^{3-2x}}{6}$ at $x = 3/2$ (20 points)

$U = e^{3-2x} \quad U' = -2e^{3-2x}$

$V = 6 \quad V' = 0$

$e^{3-2x} = \frac{-2e^{3-2x}}{6}$

$\frac{-2e^0}{6} \quad \frac{-2(1)}{6} = -\frac{1}{3} \qquad \frac{6(-2e^{3-2x})}{36} \qquad \frac{-2e^{3-2x}}{6} = \boxed{-\frac{1}{3}}$

$\frac{-2e^{3-(2)(3/2)}}{6}$

2) Find the derivative of $f(x) = \frac{(2x-1)^5}{x}$ (15 points) $\quad 5(2x-1)^4(2)$

$U = (2x-1)^5 \quad U' = 10(2x-1)^4$

$V = x \quad V' = 1$

$(x)(10(2x-1)^4) - (2x-1)^5(1)$

$$\boxed{f'(x) = \frac{10x(2x-1)^4 - (2x-1)^5}{x^2}}$$

3) Find the derivative $g(x) = 3x^2 + \frac{1}{e^{2x}} + \ln(4x^2+3) + e$ (15 points)

$6x + e^{-2x} +$

$U = \ln \quad U' = \frac{1}{x}$

$V = 4x^2+3 \quad V' = 8x$

$g'(x) = 6x - 2e^{-2x} +$

$\ln(8x) + 4x^2+3(\frac{1}{x})$

$$\boxed{g'(x) = 6x - \frac{2}{e^{2x}} + \frac{8x}{4x^2+3}}$$

$\ln 8x + \frac{4x^2+3}{x}$

Bonus

1.

$8x(\frac{1}{x}) \quad \frac{8x}{x}$

$\frac{8x}{4x^2+3}$

2. Left

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Prepa Tec
Calculus I 2nd partial
Quiz # 1A

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I. Circle the right answer. (5 point each)

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1) Find the slope for $f(x) = -5x^2$ at $x = 3$ $-5(3)^2$ $-5(9)$

A) 30 B) – 75 C) – 45 D) -30

2) What is the equation of the tangent line for the curve $y = x^3+2$ at the point $(-1,1)$

A) $y = -3x + 4$ B) $y = 3x - 4$ C) $y = 3x + 4$ D) $y = -3x - 4$

3) The following functions is not differentiable at $x = -4$

a) $f(x) = |x+4|$ b) $f(x) = x^2 - 4$ c) $f(x) = \frac{x+2}{x-4}$ $f(x) = \sqrt{-x} + 4$

4) The following function is not differentiable at $x = 1$

a) $f(x) = \frac{1}{x+1}$ b) $y = (x-1)^3$ c) $f(x) = |x+1|$ d) $f(x) = \sqrt[3]{x-1}$

II. Answer the following questions.

1. The position of an object, s, at any time, t, is given by: (15 points)
$s(t) = -18t^3 + 15t + 8$ where s is measured in feet and t is measured in seconds.
Find the equation of acceleration at any time $a(t)$.

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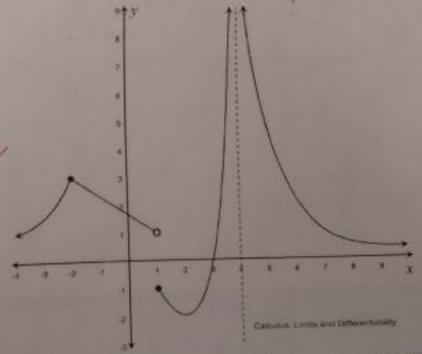
$v(t) = -54t^2 + 15$ $a(t) = -108t$

2. The following graph shows the function $y = f(x)$ (20 points)



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a) Find the values of "x" where the function is not continuous $y = -2$ $x = 1$ $x = 4$

b) Find the values of "x" where the function is not differentiable $x = 2$ $x = 0$

$-2, 1, 4$

III. Find the **derivative by definition** of the following function: (15 points)

$f(x) = 3x^2 + 5$

$\frac{f(x+h) - f(x)}{h}$

$\frac{3(x+h)^2 + 5 - (3x^2+5)}{h}$

$\frac{3(x^2+2xh+h^2)+5-(3x^2+5)}{h}$

$\frac{\cancel{3x^2} + 6xh + 3h^2 \cancel{+5} \cancel{-3x^2} \cancel{-5}}{h}$

$\frac{3h^2 + 6xh}{h}$

$\frac{h(3h+6x)}{h}$

$3h + 6x$

$3(0) + 6x$

$\boxed{f'(x) = 6x}$

IV. Find the derivative of the following:

a) $f(x) = 8\sqrt[4]{x^3} - 2x^3 + \frac{5}{x^2}$ (10 points)

$f(x) = 8x^{3/4} - 2x^3 + 5x^{-2}$

$f'(x) = 6x^{-1/4} - 6x^2 - 10x^{-3}$

$\boxed{f'(x) = \frac{6}{x^{1/4}} - 6x^2 - \frac{10}{x^3}}$

b) $f(x) = 2(1-3x^2)^5 + \sqrt{4x-1}$ (10 points)

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$\boxed{f'(x) = -60x(1-3x^2)^4 + \frac{2}{(4x+1)^{1/2}}}$

c) $f(x) = 7(4x-5x^3)^6$ (10 points)

$42(4x-5x^2)^5(4-15x^2)$

$\boxed{f'(x) = 1680x(4x-5x^2)^5}$

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Bonus

1: Mercedes Stadium

2: Left