BC Calculus — Name________________________________Pd.___

Derivatives: Review — Date______________________________Seat #___

Please start off every review with reading your notecards for that unit several times!!!!! This is a very limited review!!!!

Formal definition of a derivative- $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ *and* $f'(\#)=\lim_{h\to 0}\frac{f(\#+h)-f(\#)}{h}$

Basic Rules- (AT=anything)

Product $f(x)\bullet g(x)$		Quotient $\frac{hi}{lo}$		Chain $f(AT)$	
$\frac{dy}{dx}\left[\sin(AT)\right]=$		$\frac{dy}{dx}\left[\tan(AT)\right]=$		$\frac{dy}{dx}\left[\sec(AT)\right]=$	
$\frac{dy}{dx}\left[\cos(AT)\right]=$		$\frac{dy}{dx}\left[\cot(AT)\right]=$		$\frac{dy}{dx}\left[\csc(AT)\right]=$	
$\frac{dy}{dx}\left[\sin^{-1}(AT)\right]=$		$\frac{dy}{dx}\left[\tan^{-1}(AT)\right]=$		$\frac{dy}{dx}\left[\sec^{-1}(AT)\right]=$	
$\frac{dy}{dx}\left[f^{-1}(AT)\right]=$		$\frac{dy}{dx}\left[e^{AT}\right]=$		$\frac{dy}{dx}\left[b^{AT}\right]$	
$\frac{dy}{dx}\left[\ln(AT)\right]=$		$\frac{dy}{dx}\left[\log_b(AT)\right]=$			

Implicit Derivatives-Anytime you take a derivative of a variable with respect to a different variable

$\frac{d}{dx}\left[t^2\right]=$		$\frac{d}{dt}\left[3y+x^2\right]=$		$\frac{d}{dt}\left[xy\right]=$	

Particle Motion-

f(x)=position	f'(x)=	f''(x)=

Particle is speeding up if: — Or slowing down if:

Linearization-find a tangent line to approximate

Derivative-rate of change or slope of anything….

Practice: Non-Calculator

1. If $f(x)=7x^{-4}$, find f'(2)
   a.) -14
   b.) -3.5
   c.) -.87
   d.) -1.75

2. $y=6x^{-2}+8x^{3}+11x$, find $f'(x)$
   a.) $-12x^{-1}+24x^{2}+11$
   b.) $-12x^{-1}+24x^{2}$
   c.) $-12x^{-3}+24x^{2}+11$
   d.) $-12x^{-3}+24x^{2}$

3. Find the slope of the line tangent to the graph of $y=9x^{\frac{5}{2}}-7x^{\frac{3}{2}}$ at x=4.
   a.) 159
   b.) 6
   c.) 8
   d.) 96

4. Find the equation of the tangent line to $y=x^2-x$ at $x=-3$.
   a.) $y=-7x+6$
   b.) $y=-7x-6$
   c.) $y=-7x-9$
   d.) $y=-7x+9$

5. Find all the values where $f(x)=x^3-12x+2$ has a horizontal tangent.
   a.) $-2, 0, \& 2$
   b.) 0 & 2
   c.) 0
   d.) $2 \& -2$

6. If $g'(3)=4$ and $h'(3)=-1$, find $f'(3)$ for $f(x)=5g(x)+3h(x)+2$.
   a.) 19
   b.) 17
   c.) 23
   d.) 25

Key:
1. C
2. C
3. A
4. C
5. D
6. B

BC Calculus

Derivatives: Review

Name________________________________Pd.___

Date________________________________Seat #___

7. $g(t)=\frac{t^2}{t-11}$ find: $g'(t)$

a.) $g'(t)=\frac{t^2}{(t-11)^2}$

b.) $g'(t)=\frac{22t}{(t-11)^2}$

c.) $g'(t)=\frac{t^2+22t}{(t-11)^2}$

d.) $g'(t)=\frac{t^2-22t}{(t-11)^2}$

8. $g(x)=\frac{x^2+5}{x^2+6x}$ find: $g'(x)$

a.) $g'(x)=\frac{2x^3-5x^2-30}{x^2(x+6)^2}$

b.) $g'(x)=\frac{6x^2-10x-30}{x^2(x+6)^2}$

c.) $g'(x)=\frac{4x^3+18x^2+10x+30}{x^2(x+6)^2}$

d.) $g'(x)=\frac{x^4+6x^3+5x^2+30x}{x^2(x+6)^2}$

9. $y=\sqrt{4x+2}$

a.) $\frac{dy}{dx}=\frac{4}{\sqrt{4x+2}}$

b.) $\frac{dy}{dx}=\frac{8}{\sqrt{4x+2}}$

c.) $\frac{dy}{dx}=\frac{1}{\sqrt{4x+2}}$

d.) $\frac{dy}{dx}=\frac{2}{\sqrt{4x+2}}$

10. $f(x)=\frac{5}{(2x-3)^4}$

a.) $f'(x)=\frac{5}{4(2x-3)^3}$

b.) $f'(x)=\frac{-40}{(2x-3)^5}$

c.) $f'(x)=\frac{-40}{(2x-3)^3}$

d.) $f'(x)=\frac{5}{8(2x-3)^5}$

Key:
7. D
8. B
9. D
10.B
11.C
12.C
13.A
14.B

11. $2xy-y^2=1$ Find $\frac{dy}{dx}$

a.) $\frac{dy}{dx}=\frac{x}{y-x}$

b.) $\frac{dy}{dx}=\frac{x}{x-y}$

c.) $\frac{dy}{dx}=\frac{y}{y-x}$

d.) $\frac{dy}{dx}=\frac{y}{x-y}$

12. $y\sqrt{x+1}=4$ Find $\frac{dy}{dx}$

a.) $\frac{dy}{dx}=\frac{2y}{x+1}$

b.) $\frac{dy}{dx}=-\frac{2y}{x+1}$

c.) $\frac{dy}{dx}=-\frac{y}{2(x+1)}$

d.) $\frac{dy}{dx}=\frac{y}{2(x+1)}$

13. Find the equation of the tangent line to the curve $x^2+y^2+2y=0$ at the point $(0,-2)$.

a.) $y=-2$

b.) $y=-x-2$

c.) $x=0$

d.) $y=-x$

14. Find the equation of the tangent line to the curve $2xy-y^2=1$ when $x=1$.

a.) $y=x-1$

b.) $x=1$

c.) $y=-x+1$

d.) $y=1$

BC Calculus Name________________________________Pd.___
Derivatives: Review Date______________________________Seat #___

Key:
15.E
16.D
17.B
18.A
19.A
20.B
21.E
22.B
23.B

15. If $f(x)=\cos(3x)$, then $f'\left(\frac{\pi}{9}\right)=$

a.) $3\sqrt{3}/2$
b.) $\sqrt{3}/2$
c.) $-\sqrt{3}/2$
d.) $-3/2$
e.) $-3\sqrt{3}/2$

16. If $f(x)=e^{\frac{2}{x}}$, then $f'(x)=$

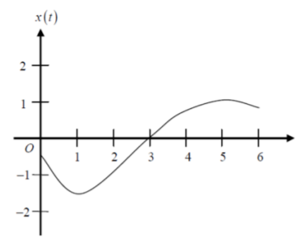
a.) $2e^{(2/x)}\ln x$
b.) $e^{(2/x)}$
c.) $e^{(-2/x^2)}$
d.) $\dfrac{-2e^{(2/x)}}{x^2}$
e.) $-2x^2e^{(2/x)}$

17. The function f is twice differentiable with $f(2)=1$, $f'(2)=4$, and $f''(2)=3$. What is the value of the approximation of $f(1.9)$ using the line tangent to the graph of f at $x=2$?

a.) 0.4
b.) 0.6
c.) 0.7
d.) 1.3
e.) 1.4

18. A particle moves along a straight line. The graph of the particle's position $x(t)$ at time t is shown in the graph of $0<t<6$. For what values of t is the velocity of the particle increasing?

a.) $0<t<2$
b.) $1<t<5$
c.) $2<t<6$
d.) $3<t<5$
e.) $1<t<2$ & $5<t<6$



19. What is the slope of the line tangent to the curve $y=\arctan(4x)$ at the point at which $x=1/4$?

a.) 2
b.) $1/2$
c.) 0
d.) $-1/2$
e.) -2

20. A particle moves along a straight line with velocity given by $v(t)=7-(1.01)^{-t^2}$ at time $t\geq 0$. What is the acceleration of the particle at time $t=3$? **Calculator**

a.) –0.914
b.) 0.055
c.) 5.486
d.) 6.086
e.) 18.087

21. A particle moves along the x-axis so that at time $t\geq 0$ its position is given by $x(t)=2t^3-21t^2+72t-53$. At what time t is the particle at rest?

a.) $t=1$
b.) $t=3$
c.) $t=7/2$
d.) $t=3$ & $t=7/2$
e.) $t=3$ & $t=4$

22. Let f be the function defined by $f(x)=x^3+x$. If $g(x)=f^{-1}(x)$ and $g(2)=1$, what is the value of $g'(2)$?

a.) $1/13$
b.) $1/4$
c.) $7/4$
d.) 4
e.) 13

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

a.) 0 b.) 4/9 c.) 7/9 d.) 6/7 e.) 5/3

BC Calculus
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Name________________________________Pd.___
Date_____________________________Seat #___

Use the table below to evaluate the following: (24-28)

x	0	1	2	3	4
f (x)	3	4	0	5	2
g(x)	1	4	3	2	4
f ′(x)	4	5	1	2	3
g′(x)	2	3	4	5	6

24. $\frac{d}{dx}\left[x^2 \cdot g(x)\right]_{x=3}$

Key:
24. 57
25. -1/9
26. 48
27. 3/2
28. 18
29. 0
30. 1/3
31.

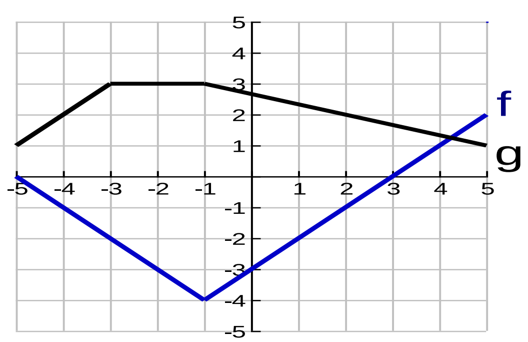
25. $\frac{d}{dx}\left[\frac{e^x}{f(x)}\right]_{x=0}$

26. $\frac{d}{dx}\left[4f(x^2)\right]_{x=2}$

27. $\frac{d}{dx}\sqrt{g(x)}\Big|_{x=4}$

28. $\frac{d}{dx}f\left[g(x)\right]\Big|_{x=4}$

Use the graph below to evaluate the following:



29. Let $w(x) = g(f(x))$. What is $w'(1)$?

30. Let $d(x) = f(\sqrt{2x+1})$. What is $d'(4)$?

31. Let $h(x) = \sqrt{f(x)}$. What is $h'(2)$?