

- What is point-slope form for the equation of a line with slope  $m$  and containing  $(x_1, y_1)$ ?  $y - y_1 = m(x - x_1)$
- State the two forms of the definition of the derivative AT A POINT.  $f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a} = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$
- State the two forms of the definition of the derivative OF A FUNCTION.  $f'(x) = \lim_{t \rightarrow x} \frac{f(t) - f(x)}{t - x} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$
- Before you evaluate any of the limits in question 2 and 3, what condition must  $f(x)$  first satisfy?
- Graphically, what 3 things will indicate that a derivative will be nonexistent at a point?

- discontinuity @ that point
- corner @ that point
- vertical tangent @ that point

- What are the Newton and Leibniz notations for the first and second derivatives of a function?

a. Newton:  $f'(x), f''(x)$

b. Leibniz:  $\frac{dy}{dx}, \frac{d^2y}{dx^2}$

- What is a normal line?

$\perp$  to tangent at same point

- What are the steps for evaluating a derivative at a point for YOUR calculator?

- What is the derivative with respect to  $x$  of a constant function?

0

- What is the derivative with respect to  $x$  of  $cf(x)$  if  $c$  is a real number?

$c \cdot f'(x)$

- What is the derivative with respect to  $x$  of  $f(x) + g(x)$ ?

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

- What is the derivative with respect to  $x$  of  $f(x) - g(x)$ ?

$f'(x) - g'(x)$

- What is the derivative with respect to  $x$  of  $x^n$  when  $n$  is a constant?

$n x^{n-1}$

- Relate each quantity to position. Remember to answer using units whenever units are provided in the question.

a. velocity  $= s'(t)$

b. acceleration  $= v'(t) = s''(t)$

c. speed  $= |v(t)|$

- When a particle moves along a straight line to the right or up, what inequality will you solve?

$v(t) > 0$

16. When a particle moves along a straight line to the left or down, what inequality will you solve?  $v(t) < 0$

17. What solution technique should be used to answer questions like 15 and 16?  $\#$  line

18. What limits may be evaluated using differentiation formulas instead of limit evaluation techniques of

Chapter 2?

$$\frac{0}{0} ; m_{PQ} \text{ w/ } \lim_{Q \rightarrow P}$$

19. What is the derivative of  $f(x) \cdot g(x)$ ?  $f'(x) \cdot g(x) + g'(x) \cdot f(x)$

20. What is the derivative of  $f(x)/g(x)$ ?  $\frac{f'(x) \cdot g(x) - g'(x) \cdot f(x)}{[g(x)]^2}$

21. What is the derivative with respect to  $x$  of  $\sin x$ ?

$$\cos x$$

22. What is the derivative with respect to  $x$  of  $\cos x$ ?

$$-\sin x$$

23. What is the derivative with respect to  $x$  of  $\tan x$ ?

$$\sec^2 x$$

24. What is the derivative with respect to  $x$  of  $\sec x$ ?

$$\sec x \tan x$$

25. What is the derivative with respect to  $x$  of  $\csc x$ ?

$$-\csc x \cot x$$

26. What is the derivative with respect to  $x$  of  $\cot x$ ?

$$-\csc^2 x$$

27. What is the derivative with respect to  $x$  of  $f(g(x))$ ?

$$f'(g(x)) \cdot g'(x)$$

28. When must you use the chain rule?

a. Composition of functions

b. Variable mismatch in Leibnitz notation

29. What determines an implicit versus an explicit function?

variable mixed

$\longleftrightarrow$   $y$  or  $x$  is isolated

30. When carrying out implicit differentiation, when will the chain rule be used?

variable mismatch

31. How do you find second derivatives for implicit functions?

Take  $\frac{d}{dx} \left[ \frac{dy}{dx} \right]$  remembering chain, sub exp. for  $\frac{dy}{dx}$

32. KNOW CHAIN RULE VARIATIONS OF ALL DIFFERENTIATION FORMULAS LISTED ON THIS SHEET.

for  $y'$