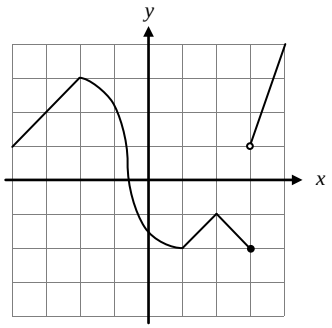
Calculus
Chapter 3 Review Sheet

Name: _____
Block: _____

1. Where is $f(x)$ NOT differentiable? Why?

Notecards!!!!



2. If $P(x) = 4x^3 - 7x - 10$ is the equation for profit on x items, find the marginal profit of the 12th item.

3. When does $f'(2)$ exist, for some function $f(x)$. (limits….)

4. If $f(x) = \begin{cases} 2ax^2 + b & x \geq 1 \\ -3x + 4 & x < 1 \end{cases}$, find a and b so that f is both continuous and differentiable.

5. If $x(t) = t^2 - 8t + 12$ is a position of a particle moving along the x axis at time t, then

a) Find the average velocity for the first 3 seconds.
b) Find the velocity at $t = 4$ seconds.
c) When is the object stopped?
d) When is the acceleration of the object 0?
e) When does the object change direction?
f) When does the object slow down?
g) When is the object moving left?

6. Find the equation of the *tangent line* to the curve $y = 2\sin x \cos x$ at $x = \frac{\pi}{2}$.

7. Find $\lim_{h \to 0} \frac{\cos\left(\frac{\pi}{2} + h\right) - \cos\left(\frac{\pi}{2}\right)}{h}$ … Find $\lim_{h \to 0} \frac{\sqrt{4+h} - 2}{h}$
(doing a lot of work here? …you're missing the point!)

8. Use the *alternative definition of the derivative* to find $f'(2)$ if $f(x) = \frac{3}{x}$.

9. Use the *alternative definition of the derivative* to find $f'(1)$ if $f(x) = 3x^2 + 5x$.

10. Given the following chart, find $f'(3)$ and explain its meaning.

x = minutes	$f(x)$ = \$
1	4
2	6
3	9
4	11

11. [Calculator] If $s(x) = \sqrt{x}\cos x$ is a position of a particle at time t, $0 \leq t \leq 2\pi$.

a) Find the velocity of the object at any time t.
b) Find the acceleration of the object at any time t.
c) When is the object stopped?
d) When does the object change direction?
f) When does the object speed up?
g) Find the zeros of $s(x)$.
h) Find the zeros of $v(x)$.
i) Find the zeros of $a(x)$

12. If $f(x)$ has a derivative at $x = 2$, tell whether or not each of the following MUST be true?

a) $\lim_{x \to 2} f(x)$ exists
b) $f'(2)$ exists
c) $f''(2)$ exists.
d) $f(x)$ is continuous at $x = 2$.
e) $\lim_{x \to 2} \frac{f(x) - f(2)}{x - 2}$ exists.
f) $\lim_{h \to 0} \frac{f(2+h) - f(2)}{h}$ exists.

Be able to sketch a graph of a derivative from the function.
Be able to state and use the *original and alternative definitions of a derivative* . ***… YEAH … that's the long way!***