V Ter	st corrections as a take home, Homework Quiz, a Mon. 1/14
The problem is irrelevant!	GoodWorkShown.pdf
oblem solving techniques: REAK THE PROBLEM DOWN - produ rite down the steps - make a plan	uct rule
emmunicate to others as mathematical notation correctly - for hat do I need? What do I have? More	proes you to think ware they connected? What step can I take?
Coming up: Kinematics Ch 17 Quiz - Wed, 1	l/9 Chapter
Areas under curves & integration Applications of integration President's Day	Applications of differential calculus
Discrete Random Variables	A Kinematics B Rates of change
Continuous Random Variables	C Optimisation Applications of differential coloring
Objectives	17A.1: #2-4 (Kinematics) 17A.2: #6-9 (Velocity & Acceleration)
 Use derivatives to solve problems inv motion. 	Ching 17B: #1-16 by 3 (Rates of change) OB #3,4,12 Test Corrections (Due Monday, 1/14)
Consider the height of a ball thrown	up from the top of a 60 foot building at an initial
h(f):	$= -16t^2 + 12t + 60$
The change of position over time is a	also known as velocity. Velocity = $\frac{\Delta Position}{\Delta Time}$
Using derivatives, we can find instan	taneous velocity by letting ∆Time → 0
Instantaneous Velocity -	m d[Time] = d(Time) = d(= n(i)
is 12 ft/sec (the initial speed!) and the 32 ft/sec every second!	 at the velocity increases (in a downward direction)
That change in velocity with respe second derivative of position (in this	ct to time is called acceleration. It is also the s case height) with respect to time.
Instantaneous Acceleration	= $\lim_{n \to \infty} \frac{\Delta Velocity}{dt} = \frac{d(Velocity)}{dt} = \frac{d^2h}{dt} = h^2(h)$
	Line+ ΔTime d(Time) dt tv
In the above example, the accelerati Notice the positions of the superscrip	on is simply, -32 ft/sec ² - gravity! ots in Leibnitz notation - the reasoning for this
will become apparent later. It is read Recall that $f'(x)$ or $f^{2}(x)$ is the secon	d "dee-two h dee-tee squared" ad derivative of f with respect to x. It represents
the slope of the slope" or the curva A stone is projected vertically so that	zure of f. In a motion context, f'(f) is acceleration t its position above ground level after
t seconds is given by $s(t) = 98t - 4$. a Find the velocity and acceleration	$9t^2$ metres, $t \ge 0$. functions for the stone and draw sign
diagrams for each function. b Find the initial position and veloci c Describe the storage section of the sto	ity of the stone. $s_t = 5$ and $t = 12$ seconds
 d Find the maximum height reached e Find the time taken for the stone t 	by the stone.
a) v(1) = 98 - 9.82 a(0) = -9.8 b) a(0) = 0 m above ground; v(0) = 98	m/sec upward
c) a(5) = 368 ft above ground; v(5) = 49 a(12) = 470 ft above ground; v(12) = - ¹ dt) a(12 = 98 - 9.82 = 0 when t = 10 sec. and	misec upward a(5) = -9.8 misec' slowing 19.6 misec (down) a(5) = -9.8 misec' speeding up v channes sim at L = 10 - max haidd is s(10) a 400 ft shows or
 (i) = 0 when \$81 - 4.92 = 0 or 4.98(20 - The values of position, veloc 	 0 so store hits at t = 20. Symmetry also works since s(0) = city, and acceleration at t = 0 are called the
In Another common context is motion a and acceleration of an object on the	itial conditions. along a straight line. Consider the location, veloci end of a spring for example.
Position Agiven problem involves an original sector of the sect	in. It is generally the position of the object at t = 0
aways). Know where it is in a gri position of the spring at rest or it is some support.	can be the location where the spring is attached to can be the location where the spring is attached to
 Displacement (often we use the a vector as it has magnitude and between displacement and distant 	letter s) is the signed distance from the origin. I direction relative to the origin. Note the distinction was travelled
 Position can be considered as a Watch carefully when this word is 	point (scalar) or as a displacement from 0 (vector used.
Velocity	
Velocity Average velocity is the net chang <u>Aposition</u>	ge in position divided by elapsed time. $s(t_2) - s(t_1)$
Velocity · Average velocity is the net chang <u>∆position</u> <u>∆time</u> Note that velocity is also a vector	ge in position divided by elapsed time. $\frac{s(t_2) - s(t_1)}{t_2 - t_1}$ rate in the solution and magnitude relative to the
Velocity · Average velocity is the net chan <u>Aposition</u> <u>Atime</u> · Note that velocity is also a vector origin. Speed, on the other hand, Instantaneous velocity is the inst	ge in position divided by elapsed time. $\frac{g(t_2) - g(t_1)}{t_2 - t_1}$ are it has direction and magnitude relative to the is a scalar - the magnitude of velocity.
Velocity · Average velocity is the net champion of the set of t	ge in position divided by elapsed time. $\frac{u(t_2)-u(t_1)}{t_2-t_1}$ as at has direction and magnitude relative to the is a scalar- the magnitude of velocity, landanceous rate of change of displacement vs time $v(t_1)$
Velocity: Average velocity is the net chang Δtime^{-1} Note that velocity is also a vector origin. Speed, on the other hand, Instanceous velocity is the inst better known as: $v(t) = \frac{dt}{dt} = s$ Average acceleration is the net of	ge in position divided by elapsed time. $\frac{\underline{s}(\underline{s}) - \underline{s}(\underline{s})}{t_2 - t_1}$ $\frac{1}{t_2 - t_1}$ $\underline{s} = c_1 + s_2$ which can and magnitude relative to the is a casher - the magnitude of velocity. Introduced the term of the second of the second
Velocity $\frac{\Delta position}{\Delta time}$	ge is position divided by elapsed time. $\frac{g(f_{0})-g(f_{0})}{f_{0}-f_{0}}$ as it has direction and magnitude relative to the sa scalar + the magnitude of electric). In this direction, the directory of displacement vs time $\frac{g(f_{0})-g(f_{0})}{f_{0}-f_{0}}$ provided by elapsed time. $\frac{g(f_{0})-g(f_{0})}{f_{0}-f_{0}}$
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$\label{eq:constraints} \begin{array}{c} \Delta \mbox{constraints} \\ \Delta constra$	per la position divided by elapsed time. $\frac{d(j-1)(j)}{l_1-l_1}$ are the an electron and magnitude relative to the same state of a decision of elapse decision. The magnitude of elapse of displacement variation of the elapse of displacement variation $\frac{d}{d_1}(t) = \frac{d}{d_1}(t) = \frac{d}{d_1}(t)$ hange in velocity divided by elapsed time. $\frac{d}{d_1}(t) = \frac{d}{d_1}(t) = \frac{d}{d_1}(t) = \frac{d}{d_1}(t)$ deter sa that direction and magnitude relative to the instantaneous take of drange of velocity variations of the elapse of the same directions are theread. The same direction same theread is the same direction same the same direction same the same direction same theread is the same direction same direction same the same direction same direction same the same direction same directi
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