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# 'sc aim\_€

# Ac n's sg.m.ats

## A st act

As pen erc ode s de e oped o so e forced ers on of e od ens on 'roropc or c y eq on on p ne s re c ed rond e Er e e ode s des gned o prod ce r' en o nd cr de represen on of e Nor ern e spere s or r c - e pro' y d s r' ons of or c y prod ced ere n ysed e pr c r foc s on e e re e s ned-

oderene per en sa e en perfor ed a a ode rsy a deren ro on nd secondy a d de e of geos rop a r' enceasse e per en s prod ced q e y s r r' ence o pre o s n er c od e ng s des coagren so ed or ces for nd s re cad or ces con ned o de ' nd for > ore represen e of agre o spagee-

# nt\_Ats

Symbols, Constants and Acronyms

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	B- p ng freq ency	
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ym s, nstants and Ac nyms

Symbols		units
e e or c y		$s^{-1}$
Also e or c y		$s^{-1}$
Corospr eer	f	$s^{-1}$
L de		r d
or zon co ord n es	х, у	
rden of Corospreer	f/y	$^{-1}s^{-1}$
eyno d <i>s</i> n <b>\</b> er	Re	
Eddyd sonpreer		$^{2}s^{-1}$
or zon nd ec or	u u, v	$s^{-1}$
re f nc on		$2 s^{-1}$
reopo en 🕫 g 🕰	À	
Forc ng	F	$s^{-2}$
p -		

a t\_¢1

# nt 4 ctin

## 11 N m\_cca m d\_cing 😽 \_st\_c

Le scence of ner ce per forecs ng ssred not ery de cen ry ly Nor eg note: Ber nes nd pe Bergen rop n Nor y- pey for ed pe l sc pe ceq ons go ern ng pe per odyn cs nd pedrodyn cs of pe ospore Ber nes l ced pe econo ogy o so e pese eq ons pr c cy-

N erc ode ng  $\mathfrak{m}s$  proded c $\mathfrak{m}ns$  g $\mathfrak{m}no$   $\mathfrak{m}p$   $\mathfrak{m}sc$  processes go ern ng  $\mathfrak{m}s$  osp  $\mathfrak{m}re$  'y e p ng o c $\mathfrak{m}s$  co p ers ons  $\mathfrak{m}re$  o'ser ed fe res-As co p ers 'ecc e ore po erf s soon poss 'e o ncorpor e ore nd ore re s no  $\mathfrak{m}s$  odes nd y s re Re Bosc s e oods of -

 $\mathfrak{g}$  o on for  $\mathfrak{g}$  protect sonders and  $\mathfrak{g}$  ere esoccrn spener c ode-n  $\mathfrak{g}$  cone s de os dy or cy  $\mathfrak{g}$  c  $\mathfrak{g}$  s f nd en property of d o on-

## 1 V ticity - . eniting and int\_e \_tating

#### 1 1 \_eniting

or c y s e s re of oc ro on or sp n dens y of de-g-r er nd s de ned s c c c on per n re c nce

## or c y $A \rightarrow 0$ v.dl × v dA A $\rightarrow 0$ A $\rightarrow 0$ PER of 824 () 8 () 2 2 5 8 0 ()

Ly o es de core v s e o y nd  $\mathbf{A}$  s n re - Me eoro og s s de refore de ne q n y c ed re e or c y o on s

#### imes u,

Lere **U** s Le Lerzon nd ecor **U**, **V** - Lesq n y s sn esggess sre e o Lero on of Le Er Le nd Lesre r ro on dds or c y- As Le eocy of ro on depends on de sn r o de ne no Lerq n y Lec Le nc des Lesre r or c y- Les Le Loo e or c y s de ned s

#### f,

ere **f**s nons e Corospreer

#### f sn,



■ gre - N × eos rop • c \ nceN • Cor o s ■ orce O \ 1 nces • Press re × r den ■ orce P → c s ng o on o \ e n c oc se ro nd o press re sys e L n • e nor • ern • sp • ere- C rc es re so \ rs nes of eq press re nd U s • e geos rop • c nd ec or-

n <u>e</u> <u>sence</u> of *s* rf ce fr c on e ec *s* <u>e</u> osp<u>e</u>re *s* of en considered o <u>s</u> en geos rop<u>e</u>c<u>l</u> nce <u>e</u> coro<u>s</u> coro<u>s</u> corce **C** <u>s</u> nces<u>e</u> Press re <u>s</u> r den **r** orce P **r** <u>e</u> **c** coro<u>s</u> coro<u>s</u> con nd c *s* o<u>e</u> rg<u>e</u> of <u>e</u> e oc y of o ng p r ce n<u>e</u> nor<u>e</u> rn<u>e</u> *s* prere nd <u>e</u> P **r** *s* d e o<u>e</u> r e p ng o re rn o eq <u>s</u> r *s* e of press re-<u>es</u> c ses<u>e</u> r o c rc e ro nd o press re syse n n n coc se d rec on nd <u>e</u> s cycon c o on *s* de ned *s* pos e or c

## a t\_¢

# Lit\_eat \_e \_ese

## 1 m tanc v tieity

As e s or c y eng f nd en propery of a ospare s so por n s c n e considered consered q n y n cer n c ses-N er c ode ng s des of a ospare e ase a redescried e o of en se consered q n es o e ne a proper es of a o - as s e c se ny c anges n a o re no d e o ny e ern c ange resoey d e o n ern processes o ng a q n y-

Crarney fond q n y rac rate c ed pse dopoen or c y P rac ra s consered rate o n ode osprære-n rac ode rate s sen ras s dy see Craper for rac de s rac iso e or c y s eq en o Crarney s q n y for yer of ed dep rat see ec on - nd so c n ise re ed s consered r ise rate isen s s descried-

## . Jis sand Ly s

As redys in econ -- or cy nfess sefn in ospiere in og mine press resys e s in re indo nn c se of indes rf ce e inter- enn s inderson or e indes rf on of press res n e sngepon sno nor y in ss n d s r f ed- e fond press re o fe neg ey se ed rg- indo press resys e sofser ed o dep r f r inter fro inter en inter



 $\blacksquare g re - N enn s or g n g re s a ng a freq ency d s r l on of osp a r c pres$ s res- Press re ncre ses o rds a ef - eprod ced n g n c nce ne ly $per ss on of a M s er nd <math display="block">\blacksquare e o s of r on e C s Co ege C l r dge-$ 

Br ss ne os e re e e ner e en se er e s red nc d ng ne record ng ne nd o osp ner c press res- ne os e re e neg ne press re o'ser ed s n Mongo n nd ne o es non orn do press re s 'n ne es ern P c c n - As ne en se e e press re s 'n ne record o press re s ce s f r 'n fro ne en nen ne record neg ne '- enn fond nes s r A possive o co e for s e per en o dive o de ec d eren se of s s c proper es n s pos e nd neg e or c y e re es- As s cen rfg force s neg ec ed nor o de ppro on e g no e pec o see ny d erences f sgr d en nd i nce s se do n n f c or n se ospere-

## . ▼ m\_eca sim atins t \_Ac\_e

### 1 4 m.Ashna t .Ac.e

ossly rs no ed a a osp are leaded ppro ey od enson y and descring a lec e non sossly estar for ne son a a ppro on s re son leone s a a osp are s ery an yer dep a of don rgep ne rd s - A so a er c o ons c  $s^{-1}$  n a osp are regener y fress an a pr zon o ons  $s^{-1}$ . The y ro on of yer of d so ends o oc a d no od enson o on ndependen of a g a - y - o f - l





■ gre - N n ps no of Po en or c y on ne sen rop c cons n e per re s rf ce for ne Nor nern e sp nere- o rceNDep r en of Me eoro ogy e se-

On co peeyd eren sce s req ons ndn erc ode ng ec ma q es me Leen sed os dy me ricen meg ng seo sp ne s n me o er so r sys e rn nd per e-g- s espec y p or ces-  $\mathfrak{g}$ y fond s gn c n y ncre sed es of ros s  $\mathfrak{g}$ ne er co  $\mathfrak{g}$ ren or ces refor ed  $\mathfrak{g}$ n er g ng o er  $\mathfrak{g}$  sp do n-As s ncre sed  $\mathfrak{g}$  ros s decre ses o rds  $\mathfrak{g}$  of nor  $\mathfrak{s}$  sy n d s r  $\mathfrak{g}$  on s  $\mathfrak{g}$  o  $\mathfrak{g}$ eco es ore n so rop c nd  $\mathfrak{g}$ re refe er co  $\mathfrak{g}$ ren or ces-

## .1 50 n\_\$5

A ce sed e e ye rs of d fro a N on Me eoro og c
Cen er n yses o c c e a s s cs of a d s r l on of geopo en a g a a
de of p r c r sol r o er a Nor arn e sp a

eyseed nor nof gesor rc nd neg eyseed so nerds- new so no ed ne'e re eeens nech new y de ned so s de s nd rd de ons of ne en coon ed for 'o ne f of ne neg ese ness o er des nere s' rge e en s de ned s e een - s nd rd de ons fro ne en re respons e for ne o ner ne f of ne s e ness o des nd ne ry ne s e ness neg ne des-A of ne nor nd N r nd ce nerefore o's er ed n ncre sen s e ness ne de of ne ospiner cq n y nder es - ne crosso er 'e een pos e nd neg ese ness occ rred e een o'N-

. K tsis

#### , mma y

n ws C wp er so e of we er re re e n o ws s dy ws we en consideredwe s we n we ospace c s e r' en o nd ws we en d sc sted we n er c ode s of o d enson nd geos rop wc r' ence we e we sed o s e fe res of we ospace c sys e - we s s c res s of we s s ons s c we s we rge es of ross fond n r' ence ode s 'e co p red we we res s of ws pro ec -

o eolser onsof les scrof or cyn le ospiere le leens rsed lesenc de leolser on le led srl on of ospierc press ressno sy e rc nd le lese ness of led srl on of or cyncre ses le de-lese

## a t\_¢

# 🔨 m\_é-ca M 🌢 \_e \_e m\_At

## 1 🥵 ng t \_en m\_ëca m 🚛 🦉

#### 11 Ba t iev tieity e ation

Le goernng eq on for Le e o on of or cycn Le der ed fro Le o en eq ons on rong spiere-Le ospiere s ery Len d n copr son o Le sze of Le p ne nd c n o rs ppro on Le considered s od en son -Ano Le considered s od en son - Le de s o ss e Le ospiere s



 $\blacksquare g re - ND gr s @ ng @ geo erc se p of @ ode @ de \ nd r pp ng ro nd @ g o \ e-$ 

### 1 singt on moica sc .m.e

## nitia c nitit ns

#### B maycm

## a t.e

# tatistica M\_t d gy

 $\underset{\mathbf{M}}{\overset{\mathbf{M}}{\mathbf{S}}} C_{\mathbf{M}} \mathbf{p} \text{ er de nes nd descr} \underbrace{\mathsf{es}}_{\mathbf{k}} s s c e_{\mathbf{k}} \mathbf{do ogy}_{\mathbf{k}} s gong o \underbrace{\mathsf{e}}_{\mathbf{k}} s e s e d o nes g e or c y n_{\mathbf{k}} o de s ons-$ 

## 1 M m\_Ats

 $\texttt{mes} \ \texttt{peoens} \ \texttt{m_k} \ \texttt{of} \ \texttt{rndo} \ \texttt{r} \ \texttt{l} \ \texttt{e} \ \texttt{redened} \ \texttt{s}$ 

$$\begin{array}{c} - & n \\ & \overline{n} & i, \\ n \\ m_k & - n \\ n \\ i = 1 \end{array} i - {-k } \quad \mathrm{for} \ k \quad , \end{array}$$

ære æ e n s deno ed  $\lfloor y - \& s$  nd rd de on s e ness nd r os s re de ned respec e y s

$$\begin{array}{ccc} \mathbf{s} & \overline{\mathbf{m}_2},\\ \mathbf{b}_1 & \frac{\mathbf{m}_3}{\mathbf{s}^3},\\ \mathbf{b}_2 & \frac{\mathbf{m}_4}{\mathbf{s}^4}. \end{array}$$

- -

n∉sndrdde on esresne dnofdsr∖on r f

re en o er s' c en y rge e n er - r core c'rg en s pp y o Le d s r lo on of n' nd so co pr sons c'n le de le een e re e pos e

## a t.e

## y at y ata Ana ysiz

### 1 nt $\mathbf{4}$ ct $\mathbf{h}$

on erc e per en s reperfor ed s ng  $\mathfrak{A}$  ode descried n C  $\mathfrak{A}$ per rs y  $\mathfrak{A}$  od en son rience c se  $\mathfrak{A}$  nd second y  $\mathfrak{A}$  geos rop  $\mathfrak{A}$  c rience c se  $\mathfrak{A}$  > -

## 11 4 dim Asi na t Acleasle

a csescaseno es a ode a a ercopconsof ad eren roon nd so oscoprsons ao arn ercs desof od enson rience-Passcy as son represens rience on cyndrc pne'n as son s appen or cyP seq o are e or cy - Teg--sa s sn psa of a or cy ed fer dys- cery sa s a coaren or ces a for n as e y spreosn erc s desof o d enson rience e-g-Mc s - a d erences e een as s dy nd preos od enson rience odes s a e reforcing a rience nd are nc ded zon o - a sn psa sa s a or ces for ng n a forcing region nd propog ng ong a do n-

we res s presented were refronce prc rse of n condons nd we sens y o wese n condons s d sc ssed n ec on - -

#### .1 \_est ict \_Ac\_ecas\_e

A ore resson Ermand and many more of a construction of the constr



A sn ps a of a re e or c y s s a n n g- - 1 nd s c e r a a o c ses re s r ng y d eren a c se s a s sep r ed co a ren or ces d eren des a re s a dd on of ens res a or ces re concen r ed n 1 nd nd






■gre - NL de ecross sec on of re e or c y for n d y s ces s r ng **t** -



The gree of the construction of the construct

Ļ	С	d



d

 $\mathbf{c}$ 

### ∴ im\_G\_G\_G and ist g am







■ gre - NMenofpoen or cyfor @res spresened Loe nd L c nd d for d eren r ndo n cond ons-

### mma y

										<b>♦</b> €	
n <b>e</b>	0	en s of	<b>R</b> 3	ed geos rop 📭	-	-	-	-	-	гумторн фо о-	n <b>4</b>

a t\_¢

# ×t\_m\_§ V ticity in \_Ac\_6

### 1 nt d ctin





Latit d\_waitin v ticity\_st\_m\_s

\*E dsr  $\downarrow$  on-  $_{MS}s$  ey o  $\lfloor$ ed e o  $\lfloor$ o nd ry e ec s nd  $_{MS}$  grd pon s ne r  $_{MS}$  o nd ry s  $_{MS}$  d  $\lfloor$ e gnored-

cnleseen a mees eds apepr eers reconssen modependence on den me eper en - mes apepr eers sgavpos efor mepos e or cyere es locussen meerofor meen recenr regon nd meerrors re ppro ey±. - Por men mes apepr eers sgn cnyneg eo er me mernger mer manzero sgges ng me men nd mes gmy d eren »Edsrlonsmees-

Le neg e s Le pe pr e er for Le neg e or c y e re es Leg Le press re sys e s p es Le Les e sys e s Le e ne lo nd Le re s Le pos e or c y e re es o press re sys e s Le e s Le pe pr e er cons s en Le zero Le c Le pes Le n n e es of or c y c n occ r- Le f c Le Le d's r lo ons re no e c y sy er c nd Le lo d gree en Le Le ol ser ons enn so see ec on - Le Leg Le press re sys e s re no so e re e s s rpr s ng res n Les o



### Mas v ticity . t. m.s





### Asitivity t initia c miting

■ g-- s @ s @ \*E d s r on s @ pep r e er for for d eren s r ng r n do n cond ons @ rs ro s @ ode r n re dy n ysed nd s @ s @ sy e ry e een @ ef co n nd n rg @ co n - @ second ro s @ s n sy e ry n @ oppos e d rec on @ gener y ore neg e s @ pe p r e er n @ p @ n @ n p- @ o @ r or ns s @ ore sy e rc s @ pe r e er e een @ nd n -

westeres sreec weckengen we en orcyswenn™g-- wewerns we oresy erc psof we en we de sosweng oresy ercp ern n westwepepr eersof we nd n -

eso ng ere sons for es ec req res ore de ed n ys s nc d ng n ense Le of onger s ons-

#### \_ mma y

Let est ed → E d s r l on s ne pep r e ers re sy erc nerespec o ne s gn of or c y n ne od enson r l ences on l ness sno neg ney s gn c n nd s n cond on dependen - n ne geos rop nec r l ence c se nes sy ery s no presen ne g ne nere re s rong r ons of ne s ne pep r e er ne de- n lo nes ons ne sc e nd oc on p r e ers s ne s r fe res o ness seen n ne o en es es-



ol\_sered n ne ospinere nison n co on nepre o s ners e-g-N r nd ce

### t \_t \_ctins

f  $_{\text{e}}$  ere s ore e nd ore co p ng reso rces  $\downarrow$  e  $_{\text{e}}$  n  $_{\text{e}}$  re re n  $\downarrow$  er of f r  $_{\text{e}}$  r n yses nd e per en s  $_{\text{e}}$  co d  $\downarrow$  e perfor ed-

#### ...1 im atin\_n\_fagt

sseen n & osp were we sor r c s we ecycles of periods of d eren sreng we nd c y- wisc were cers c s so seen n o we row ences ons wo g we we dy odern were ered eren reg es-n wiss dy wese d eren reg es we even rge y gnored n we s s c es es- cen c y o d ve ve o n ysee c were g e sep r e y o see we we e es ry n e c we se nd we wer wey red eren - o do wis onger s on o d ve needed o prod ce onger per ods of e c were g e-

A onger s on eng wa o d so we pred ce we errors n we s s c es es-C rren y we sy eryofe re esseen n we od enson c se s no pr c ry s gn c n - wa ore or c y d we q es on co d le reso ed- C rren y we s on eng we nco p sses ro nd n ers were s we olser onsof we e co s -



■ gre - 'N n ps of of ds r on of pss e r cer n geos rop oc r ence-

odleneres ng osee f pss er cern nen er code ced n nes e y-

#### nc s. is it is nta s tin

ne or e nercen res re con n y ng o ncre se ne reso on of ner o de s n ne or o ore cc r eypred c ne e ner- ne Me O ce o-n - - -

noe snoper

### A A A

# 🔨 m\_ëca M 🌢 \_e \_gen

### Al \_@at be\_@athnag ht m

we gor we set for we N erc Mode ng od e M M -

### A11 Jegn

Once an erc scale s dec ded s an necess ry o code p a ode-Tro an cond ons of or c y nd s re f nc on a fo o ng seq ence s



rg re A- N ∉ co p on ode of ∉ n er c sc ∉ e- ∉ e ne s n ered erson of ∉ or c y sngepon o er ∉ er nge nd c ed-

# A1 m tationa m d\_e t\_en m\_e ca sc\_fn\_e

Agen sing centred e por scale e sine \e a agre sine riso on o agen e derence eq ons-assico p on ode sin rificio fagen erc scale e nd sinor yosc ory-ag\e e ne n mege-A-sagis ageor cy pricipation for s eringe nd sagis ageo p on ode actappers s per posed on apagis c ode- cin \e seen a ageode ss . nd assispryde o aged son er nage ons acta ages od po ageos osc ons-agre re no n ering ectand es o ager

### A JA B

## 🔨 m\_e-ca M d\_e \_sting

### B1 im atin dert

C noos ng ne eng noof ne odern s c ne ed ly need ng eno g nd o ens re ne s s cs re rol s l ne ne s of e o perfor ne r ns nd d s sp ce o consder- ne e of d ys s c no sen ne sp n p e of d ys e ng d ys for ne s s cs o le c c ed o er- ne s le en c ne c ed ne ne e s red s s cs do no c ne ng e ery s gn c n y for s g ne y d eren es of ne sp n p e-

 e of dys for e spn p scesen pry ye nng e pse o e no sen of ern nd pry ye nng e c e o ens e esses n n m g-B-- epnesse es ndrd o ensc c edc ey srng endof ern e-g- epon po ed dys sec e o en for ed fro dyse c- e o ensse fr o n of r on en en eng eced srongy y ed eren c yreg es n ern-es rge epons renosy sere refe d pons no ed-

One of  $\mathfrak{k}$  os sr ng fe resof  $\mathfrak{k}$  posfor  $\mathfrak{k}$   $\mathfrak{k}$   $\mathfrak{g}$   $\mathfrak{k}$ r o en sre  $\mathfrak{k}$  rge psn se ness nd rosse-g-  $\mathfrak{k}$  o dys-  $\mathfrak{k}$  de onsres  $\mathfrak{g}$  fe e re e es c n ec  $\mathfrak{k}$  o en es fr ore sgn c n y an g e e peced-As pre o sy d sc ssed  $\mathfrak{k}$  s so no ed  $\mathfrak{k}$  N r nd ce n  $\mathfrak{k}$  rol ser ons of geopo en  $\mathfrak{k}$  g  $\mathfrak{k}$  are  $\mathfrak{k}$  e re e es do n ed  $\mathfrak{k}$  es of s e ness  $\mathfrak{k}$  y o ser ed-sng  $\mathfrak{k}$  q n e o en s no s  $\mathfrak{k}$  n  $\mathfrak{k}$  ps refress sgn c n s e peced d e o  $\mathfrak{k}$  e s res  $\mathfrak{k}$  eng ess dependen on nd d e en s nd  $\mathfrak{k}$  y c n  $\mathfrak{k}$ 

### B stimating an tima c siz.e

**♦** 

\` <u>@</u> n	sng ∍E	dsr 🕻	on o cons der e	e re es	ec on	descr Les 🔊	3
necess	ry o es	e n op	oc sze o	e 🔊	nd	n o er-	5
ncre s ng  $\lfloor oc sze$  an a condence ner s s n  $\blacksquare$  or  $\lfloor oc szes ess$  an d ys a s peptre er s of en no cons n - a condence ner s  $\lfloor eco$  e rger a ncre s ng  $\lfloor oc sze s$  are re ess pon s o r a  $\blacktriangleright E$  d s r  $\lfloor on o - A \rfloor$  oc s ze of d ys s ance c as s s  $\lfloor esze$  for as e per en -

Le gres so s Le La n Le od enson r'ence e per en lo La Le e Le dod nd cosed for es es gree Le c La g es s condence n Le r sen Le geos rop Le c e per en Le gree en s no s cose nd s no ed Le Le e Le dod Le dore ro le con erg ng n Les c se- s dec ded o se Le cosed for es es predo n n y s Ley re e s er o c c e nd Ley so o ppro e condence n er s o le es ed-

## B⊱ ⊱g a y

Assen - -  $\mathbf{Freq}$  ency erfor e negrons-Mon- e ere - 100 -

r c n - - Mongo ery D- - o d en son r ence- ep-Prog-P nes-43 -

- Len Brd P-Cr P-A-D on M-A- LZ- olers N-Mser rerns and segmereso on r ode-Me-O cerrorecs ng eserca ecan c epors No- -
- LyD- Nercs on of odenson r∖ence-Pass-rds Suppl. II -
- Lorenz E-N- C e c e nge s e c prole - App-Me 9 -
- M r d M-E-  $s \sim -$  Energy spec r nd co veren s r c res n forced od enson nd ve p ne rv ence- d Mec ve 228 -
- Mc s - On cree nce of o d enson r' ence o geop cr d o ons- o rn de Mec n q e cor q e e App q ee **Sp. Issue** -
- Mc  $s \ldots = s$  e ergence of so ed co area or ces n r en o -  $\blacksquare$  d Mec a 146 -