```
/* Import data */

filename stroke '/folders/myfolders/table11_1.csv';

proc import datafile=stroke dbms=csv out=stroke;
getnames=yes;
run;

proc contents data=stroke; run;

/* Wide to long format */
data stroke;
keep id group time fas;
set stroke;
time=1; fas=week1; output;
time=2; fas=week2; output;
time=3; fas=week3; output;
time=4; fas=week4; output;
time=5; fas=week5; output;
time=6; fas=week6; output;
time=7; fas=week7; output;
time=8; fas=week8; output;

proc print data=stroke(obs=16); run;

/* Model 1: random intercept */
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
run;

proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
output out=tmp
pred(noblup noilink)=etafixed pred(blup noilink)=eta
pred(noblup   ilink)=fitfixed pred(blup   ilink)=fit;
run;

proc print data=tmp(obs=16); run;
```

```
/* Model 2: random intercept and slope (independent) */
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id g v vcorr solution;
run;


/* Model 3: random intercept and slope (correlated) */
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id type=un g v vcorr solution;
run;
```

Import data

The CONTENTS Procedure

Data Set Name	WORK.DT	**Observations**	24
Member Type	DATA	**Variables**	10
Engine	V9	**Indexes**	0
Created	10/12/2020 23:25:39	**Observation Length**	80
Last Modified	10/12/2020 23:25:39	**Deleted Observations**	0
Protection		**Compressed**	NO
Data Set Type		**Sorted**	NO
Label			
Data Representation	SOLARIS_X86_64, LINUX_X86_64, ALPHA_TRU64, LINUX_IA64		
Encoding	utf-8 Unicode (UTF-8)		

Engine/Host Dependent Information	
Data Set Page Size	65536
Number of Data Set Pages	1
First Data Page	1
Max Obs per Page	817
Obs in First Data Page	24
Number of Data Set Repairs	0
Filename	/tmp/SAS_work919500001316_localhost.localdomain/SAS_work15B400001316_localhost.localdomain/dt.sas7bdat
Release Created	9.0401M6
Host Created	Linux
Inode Number	141591
Access Permission	rw-rw-r--
Owner Name	sasdemo
File Size	128KB
File Size (bytes)	131072

Alphabetic List of Variables and Attributes					
#	**Variable**	**Type**	**Len**	**Format**	**Informat**
2	group	Char	1	$1.	$1.
1	id	Num	8	BEST12.	BEST32.
3	week1	Num	8	BEST12.	BEST32.
4	week2	Num	8	BEST12.	BEST32.
5	week3	Num	8	BEST12.	BEST32.
6	week4	Num	8	BEST12.	BEST32.
7	week5	Num	8	BEST12.	BEST32.
8	week6	Num	8	BEST12.	BEST32.

The CONTENTS Procedure

Alphabetic List of Variables and Attributes					
#	**Variable**	**Type**	**Len**	**Format**	**Informat**
9	week7	Num	8	BEST12.	BEST32.
10	week8	Num	8	BEST12.	BEST32.

Obs	id	group	time	fas
1	1	A	1	45
2	1	A	2	45
3	1	A	3	45
4	1	A	4	45
5	1	A	5	80
6	1	A	6	80
7	1	A	7	80
8	1	A	8	90
9	2	A	1	20
10	2	A	2	25
11	2	A	3	25
12	2	A	4	25
13	2	A	5	30
14	2	A	6	35
15	2	A	7	30
16	2	A	8	50

Model 1


```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
run;
```

The GLIMMIX Procedure

Model Information	
Data Set	WORK.DT
Response Variable	fas
Response Distribution	Gaussian
Link Function	Identity
Variance Function	Default
Variance Matrix Blocked By	id
Estimation Technique	Restricted Maximum Likelihood
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
id	24	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Number of Observations Read	192
Number of Observations Used	192

Dimensions	
G-side Cov. Parameters	1
R-side Cov. Parameters	1
Columns in X	2
Columns in Z per Subject	1
Subjects (Blocks in V)	24
Max Obs per Subject	8

Optimization Information	
Optimization Technique	Dual Quasi-Newton
Parameters in Optimization	1
Lower Boundaries	1
Upper Boundaries	0
Fixed Effects	Profiled
Residual Variance	Profiled
Starting From	Data

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	1469.6384392	.	2.49E-14

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
run;
```


The GLIMMIX Procedure

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Res Log Likelihood	1469.64
AIC (smaller is better)	1473.64
AICC (smaller is better)	1473.70
BIC (smaller is better)	1475.99
CAIC (smaller is better)	1477.99
HQIC (smaller is better)	1474.26
Generalized Chi-Square	15256.51
Gener. Chi-Square / DF	80.30

Estimated G Matrix		
Effect	**Row**	**Col1**
Intercept	**1**	393.80

Estimated V Matrix for id 1								
Row	**Col1**	**Col2**	**Col3**	**Col4**	**Col5**	**Col6**	**Col7**	**Col8**
1	474.10	393.80	393.80	393.80	393.80	393.80	393.80	393.80
2	393.80	474.10	393.80	393.80	393.80	393.80	393.80	393.80
3	393.80	393.80	474.10	393.80	393.80	393.80	393.80	393.80
4	393.80	393.80	393.80	474.10	393.80	393.80	393.80	393.80
5	393.80	393.80	393.80	393.80	474.10	393.80	393.80	393.80
6	393.80	393.80	393.80	393.80	393.80	474.10	393.80	393.80
7	393.80	393.80	393.80	393.80	393.80	393.80	474.10	393.80
8	393.80	393.80	393.80	393.80	393.80	393.80	393.80	474.10

Estimated V Correlation Matrix for id 1								
Row	**Col1**	**Col2**	**Col3**	**Col4**	**Col5**	**Col6**	**Col7**	**Col8**
1	1.0000	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306
2	0.8306	1.0000	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306
3	0.8306	0.8306	1.0000	0.8306	0.8306	0.8306	0.8306	0.8306
4	0.8306	0.8306	0.8306	1.0000	0.8306	0.8306	0.8306	0.8306
5	0.8306	0.8306	0.8306	0.8306	1.0000	0.8306	0.8306	0.8306
6	0.8306	0.8306	0.8306	0.8306	0.8306	1.0000	0.8306	0.8306
7	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306	1.0000	0.8306
8	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306	1.0000

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
run;
```


The GLIMMIX Procedure

Covariance Parameter Estimates			
Cov Parm	Subject	Estimate	Standard Error
Intercept	id	393.80	119.09
Residual		80.2974	8.7874

Solutions for Fixed Effects					
Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	30.9301	4.2941	23	7.20	<.0001
time	4.7644	0.2822	167	16.88	<.0001

Type III Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
time	1	167	284.95	<.0001

Solution for Random Effects						
Effect	Subject	Estimate	Std Err Pred	DF	t Value	Pr > |t|
Intercept	id 1	11.0974	5.0782	167	2.19	0.0303
Intercept	id 2	-21.8138	5.0782	167	-4.30	<.0001
Intercept	id 3	15.9731	5.0782	167	3.15	0.0020
Intercept	id 4	-2.9204	5.0782	167	-0.58	0.5660
Intercept	id 5	46.4464	5.0782	167	9.15	<.0001
Intercept	id 6	-1.0920	5.0782	167	-0.22	0.8300
Intercept	id 7	-1.0920	5.0782	167	-0.22	0.8300
Intercept	id 8	-0.4825	5.0782	167	-0.10	0.9244
Intercept	id 9	18.4110	5.0782	167	3.63	0.0004
Intercept	id 10	20.8488	5.0782	167	4.11	<.0001
Intercept	id 11	5.6122	5.0782	167	1.11	0.2707
Intercept	id 12	-13.8907	5.0782	167	-2.74	0.0069
Intercept	id 13	18.4110	5.0782	167	3.63	0.0004
Intercept	id 14	-36.4410	5.0782	167	-7.18	<.0001
Intercept	id 15	-9.6245	5.0782	167	-1.90	0.0598
Intercept	id 16	-1.0920	5.0782	167	-0.22	0.8300
Intercept	id 17	-24.2517	5.0782	167	-4.78	<.0001
Intercept	id 18	-13.8907	5.0782	167	-2.74	0.0069
Intercept	id 19	-12.6718	5.0782	167	-2.50	0.0136

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
run;
```


The GLIMMIX Procedure

Solution for Random Effects

Effect	Subject	Estimate	Std Err Pred	DF	t Value	Pr > |t|
Intercept	id 20	22.0677	5.0782	167	4.35	<.0001
Intercept	id 21	28.1624	5.0782	167	5.55	<.0001
Intercept	id 22	-16.9381	5.0782	167	-3.34	0.0010
Intercept	id 23	-21.2043	5.0782	167	-4.18	<.0001
Intercept	id 24	-9.6245	5.0782	167	-1.90	0.0598

Covariance Matrix for Fixed Effects

Effect	Row	Col1	Col2
Intercept	**1**	18.4397	-0.3585
time	**2**	-0.3585	0.07966

Model 1 with more options


```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
output out=tmp
pred(noblup noilink)=etafixed pred(blup noilink)=eta
pred(noblup   ilink)=fitfixed pred(blup   ilink)=fit;
run;

proc print data=tmp(obs=16); run;
```

The GLIMMIX Procedure

Model Information	
Data Set	WORK.DT
Response Variable	fas
Response Distribution	Gaussian
Link Function	Identity
Variance Function	Default
Variance Matrix Blocked By	id
Estimation Technique	Restricted Maximum Likelihood
Degrees of Freedom Method	Containment

Class Level Information		
Class	**Levels**	**Values**
id	24	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Number of Observations Read	192
Number of Observations Used	192

Dimensions	
G-side Cov. Parameters	1
R-side Cov. Parameters	1
Columns in X	2
Columns in Z per Subject	1
Subjects (Blocks in V)	24
Max Obs per Subject	8

Optimization Information	
Optimization Technique	Dual Quasi-Newton
Parameters in Optimization	1
Lower Boundaries	1
Upper Boundaries	0
Fixed Effects	Profiled
Residual Variance	Profiled
Starting From	Data

Iteration History					
Iteration	**Restarts**	**Evaluations**	**Objective Function**	**Change**	**Max Gradient**
0	**0**	4	1469.6384392	.	2.49E-14

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
output out=tmp
pred(noblup noilink)=etafixed pred(blup noilink)=eta
pred(noblup   ilink)=fitfixed pred(blup   ilink)=fit;
run;

proc print data=tmp(obs=16); run;
```

The GLIMMIX Procedure

nvergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Res Log Likelihood	1469.64
AIC (smaller is better)	1473.64
AICC (smaller is better)	1473.70
BIC (smaller is better)	1475.99
CAIC (smaller is better)	1477.99
HQIC (smaller is better)	1474.26
Generalized Chi-Square	15256.51
Gener. Chi-Square / DF	80.30

Estimated G Matrix		
Effect	**Row**	**Col1**
Intercept	**1**	393.80

Estimated V Matrix for id 1								
Row	**Col1**	**Col2**	**Col3**	**Col4**	**Col5**	**Col6**	**Col7**	**Col8**
1	474.10	393.80	393.80	393.80	393.80	393.80	393.80	393.80
2	393.80	474.10	393.80	393.80	393.80	393.80	393.80	393.80
3	393.80	393.80	474.10	393.80	393.80	393.80	393.80	393.80
4	393.80	393.80	393.80	474.10	393.80	393.80	393.80	393.80
5	393.80	393.80	393.80	393.80	474.10	393.80	393.80	393.80
6	393.80	393.80	393.80	393.80	393.80	474.10	393.80	393.80
7	393.80	393.80	393.80	393.80	393.80	393.80	474.10	393.80
8	393.80	393.80	393.80	393.80	393.80	393.80	393.80	474.10

Estimated V Correlation Matrix for id 1								
Row	**Col1**	**Col2**	**Col3**	**Col4**	**Col5**	**Col6**	**Col7**	**Col8**
1	1.0000	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306
2	0.8306	1.0000	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306
3	0.8306	0.8306	1.0000	0.8306	0.8306	0.8306	0.8306	0.8306
4	0.8306	0.8306	0.8306	1.0000	0.8306	0.8306	0.8306	0.8306
5	0.8306	0.8306	0.8306	0.8306	1.0000	0.8306	0.8306	0.8306
6	0.8306	0.8306	0.8306	0.8306	0.8306	1.0000	0.8306	0.8306
7	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306	1.0000	0.8306
8	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306	0.8306	1.0000

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
output out=tmp
pred(noblup noilink)=etafixed pred(blup noilink)=eta
pred(noblup   ilink)=fitfixed pred(blup   ilink)=fit;
run;

proc print data=tmp(obs=16); run;
```

The GLIMMIX Procedure

Covariance Parameter Estimates			
Cov Parm	**Subject**	**Estimate**	**Standard Error**
Intercept	id	393.80	119.09
Residual		80.2974	8.7874

Solutions for Fixed Effects					
Effect	**Estimate**	**Standard Error**	**DF**	**t Value**	**Pr > |t|**
Intercept	30.9301	4.2941	23	7.20	<.0001
time	4.7644	0.2822	167	16.88	<.0001

Type III Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
time	1	167	284.95	<.0001

Solution for Random Effects						
Effect	**Subject**	**Estimate**	**Std Err Pred**	**DF**	**t Value**	**Pr > |t|**
Intercept	id 1	11.0974	5.0782	167	2.19	0.0303
Intercept	id 2	-21.8138	5.0782	167	-4.30	<.0001
Intercept	id 3	15.9731	5.0782	167	3.15	0.0020
Intercept	id 4	-2.9204	5.0782	167	-0.58	0.5660
Intercept	id 5	46.4464	5.0782	167	9.15	<.0001
Intercept	id 6	-1.0920	5.0782	167	-0.22	0.8300
Intercept	id 7	-1.0920	5.0782	167	-0.22	0.8300
Intercept	id 8	-0.4825	5.0782	167	-0.10	0.9244
Intercept	id 9	18.4110	5.0782	167	3.63	0.0004
Intercept	id 10	20.8488	5.0782	167	4.11	<.0001
Intercept	id 11	5.6122	5.0782	167	1.11	0.2707
Intercept	id 12	-13.8907	5.0782	167	-2.74	0.0069
Intercept	id 13	18.4110	5.0782	167	3.63	0.0004
Intercept	id 14	-36.4410	5.0782	167	-7.18	<.0001
Intercept	id 15	-9.6245	5.0782	167	-1.90	0.0598
Intercept	id 16	-1.0920	5.0782	167	-0.22	0.8300
Intercept	id 17	-24.2517	5.0782	167	-4.78	<.0001
Intercept	id 18	-13.8907	5.0782	167	-2.74	0.0069
Intercept	id 19	-12.6718	5.0782	167	-2.50	0.0136

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
output out=tmp
pred(noblup noilink)=etafixed pred(blup noilink)=eta
pred(noblup   ilink)=fitfixed pred(blup   ilink)=fit;
run;

proc print data=tmp(obs=16); run;
```

The GLIMMIX Procedure

Solution for Random Effects

Effect	Subject	Estimate	Std Err Pred	DF	t Value	Pr > |t|
Intercept	id 20	22.0677	5.0782	167	4.35	<.0001
Intercept	id 21	28.1624	5.0782	167	5.55	<.0001
Intercept	id 22	-16.9381	5.0782	167	-3.34	0.0010
Intercept	id 23	-21.2043	5.0782	167	-4.18	<.0001
Intercept	id 24	-9.6245	5.0782	167	-1.90	0.0598

Covariance Matrix for Fixed Effects

Effect	Row	Col1	Col2
Intercept	**1**	18.4397	-0.3585
time	**2**	-0.3585	0.07966

Obs	id	group	time	fas	etafixed	eta	fitfixed	fit
1	1	A	1	45	35.6944	46.7918	35.6944	46.7918
2	1	A	2	45	40.4588	51.5562	40.4588	51.5562
3	1	A	3	45	45.2232	56.3206	45.2232	56.3206
4	1	A	4	45	49.9876	61.0850	49.9876	61.0850
5	1	A	5	80	54.7520	65.8493	54.7520	65.8493
6	1	A	6	80	59.5164	70.6137	59.5164	70.6137
7	1	A	7	80	64.2808	75.3781	64.2808	75.3781
8	1	A	8	90	69.0451	80.1425	69.0451	80.1425
9	2	A	1	20	35.6944	13.8806	35.6944	13.8806
10	2	A	2	25	40.4588	18.6450	40.4588	18.6450
11	2	A	3	25	45.2232	23.4094	45.2232	23.4094
12	2	A	4	25	49.9876	28.1738	49.9876	28.1738
13	2	A	5	30	54.7520	32.9382	54.7520	32.9382
14	2	A	6	35	59.5164	37.7026	59.5164	37.7026
15	2	A	7	30	64.2808	42.4670	64.2808	42.4670
16	2	A	8	50	69.0451	47.2313	69.0451	47.2313

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int / subject=id g v vcorr solution;
output out=tmp
pred(noblup noilink)=etafixed pred(blup noilink)=eta
pred(noblup   ilink)=fitfixed pred(blup   ilink)=fit;
run;

proc print data=tmp(obs=16); run;
```

BLUP: uses the predictors of the random effects in computing the statistics.
NOBLUP: does not use the predictors of the random effects in computing the statistics.
ILINK: computes the statistic on the scale of data.
NOILINK: computes the statistic on the scale of the link function

Model 2

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id g v vcorr solution;
run;
```

The GLIMMIX Procedure

Model Information	
Set	WORK.DT
Response Variable	fas
Response Distribution	Gaussian
Link Function	Identity
Variance Function	Default
Variance Matrix Blocked By	id
Estimation Technique	Restricted Maximum Likelihood
Degrees of Freedom Method	Containment

Class Level Information		
Class	**Levels**	**Values**
id	24	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Number of Observations Read	192
Number of Observations Used	192

Dimensions	
G-side Cov. Parameters	2
R-side Cov. Parameters	1
Columns in X	2
Columns in Z per Subject	2
Subjects (Blocks in V)	24
Max Obs per Subject	8

Optimization Information	
Optimization Technique	Dual Quasi-Newton
Parameters in Optimization	2
Lower Boundaries	2
Upper Boundaries	0
Fixed Effects	Profiled
Residual Variance	Profiled
Starting From	Data

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id g v vcorr solution;
run;
```


The GLIMMIX Procedure

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	1368.4727062	.	203.362
1	0	3	1359.6750518	8.79765445	13.79866
2	0	4	1357.061612	2.61343975	30.14966
3	0	2	1356.5209821	0.54062990	4.492908
4	0	4	1352.7635049	3.75747721	15.80958
5	0	4	1350.3935937	2.36991122	3.336603
6	0	3	1350.0086185	0.38497523	5.305291
7	0	3	1349.9079149	0.10070355	2.93811
8	0	3	1349.8837091	0.02420578	1.005367
9	0	3	1349.8770609	0.00664822	0.188588
10	0	3	1349.8763444	0.00071656	0.013848
11	0	3	1349.876342	0.00000231	0.000055

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics	
-2 Res Log Likelihood	1349.88
AIC (smaller is better)	1355.88
AICC (smaller is better)	1356.01
BIC (smaller is better)	1359.41
CAIC (smaller is better)	1362.41
HQIC (smaller is better)	1356.81
Generalized Chi-Square	5126.37
Gener. Chi-Square / DF	26.98

Estimated G Matrix			
Effect	Row	Col1	Col2
Intercept	1	392.22	
time	2		8.9367

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id g v vcorr solution;
run;
```


The GLIMMIX Procedure

Estimated V Matrix for id 1								
Row	Col1	Col2	Col3	Col4	Col5	Col6	Col7	Col8
1	428.14	410.09	419.03	427.97	436.90	445.84	454.78	463.71
2	410.09	454.95	445.84	463.71	481.59	499.46	517.33	535.21
3	419.03	445.84	499.63	499.46	526.27	553.08	579.89	606.70
4	427.97	463.71	499.46	562.19	570.95	606.70	642.45	678.19
5	436.90	481.59	526.27	570.95	642.62	660.32	705.00	749.69
6	445.84	499.46	553.08	606.70	660.32	740.92	767.56	821.18
7	454.78	517.33	579.89	642.45	705.00	767.56	857.10	892.68
8	463.71	535.21	606.70	678.19	749.69	821.18	892.68	991.15

Estimated V Correlation Matrix for id 1								
Row	Col1	Col2	Col3	Col4	Col5	Col6	Col7	Col8
1	1.0000	0.9292	0.9060	0.8723	0.8329	0.7916	0.7507	0.7118
2	0.9292	1.0000	0.9351	0.9169	0.8907	0.8603	0.8285	0.7970
3	0.9060	0.9351	1.0000	0.9424	0.9288	0.9090	0.8861	0.8621
4	0.8723	0.9169	0.9424	1.0000	0.9499	0.9400	0.9255	0.9085
5	0.8329	0.8907	0.9288	0.9499	1.0000	0.9570	0.9499	0.9394
6	0.7916	0.8603	0.9090	0.9400	0.9570	1.0000	0.9632	0.9583
7	0.7507	0.8285	0.8861	0.9255	0.9499	0.9632	1.0000	0.9685
8	0.7118	0.7970	0.8621	0.9085	0.9394	0.9583	0.9685	1.0000

Covariance Parameter Estimates			
Cov Parm	Subject	Estimate	Standard Error
Intercept	id	392.22	120.33
time	id	8.9367	2.8220
Residual		26.9809	3.1951

Solutions for Fixed Effects					
Effect	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept	30.9301	4.1261	23	7.50	<.0001
time	4.7644	0.6318	23	7.54	<.0001

Type III Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
time	1	23	56.87	<.0001

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id g v vcorr solution;
run;
```


The GLIMMIX Procedure

Solution for Random Effects

Effect	Subject	Estimate	Std Err Pred	DF	t Value	Pr > |t|
Intercept	id 1	-0.1005	5.5353	144	-0.02	0.9855
time	id 1	2.5515	0.9642	144	2.65	0.0090
Intercept	id 2	-15.2588	5.5353	144	-2.76	0.0066
time	id 2	-1.5511	0.9642	144	-1.61	0.1099
Intercept	id 3	9.0363	5.5353	144	1.63	0.1048
time	id 3	1.6147	0.9642	144	1.67	0.0962
Intercept	id 4	-17.5346	5.5353	144	-3.17	0.0019
time	id 4	3.2646	0.9642	144	3.39	0.0009
Intercept	id 5	65.0596	5.5353	144	11.75	<.0001
time	id 5	-3.9975	0.9642	144	-4.15	<.0001
Intercept	id 6	-27.0292	5.5353	144	-4.88	<.0001
time	id 6	5.8093	0.9642	144	6.03	<.0001
Intercept	id 7	-14.0482	5.5353	144	-2.54	0.0122
time	id 7	2.8998	0.9642	144	3.01	0.0031
Intercept	id 8	-5.0333	5.5353	144	-0.91	0.3647
time	id 8	1.0182	0.9642	144	1.06	0.2927
Intercept	id 9	8.0757	5.5353	144	1.46	0.1468
time	id 9	2.3856	0.9642	144	2.47	0.0145
Intercept	id 10	29.2310	5.5353	144	5.28	<.0001
time	id 10	-1.8005	0.9642	144	-1.87	0.0639
Intercept	id 11	-14.4059	5.5353	144	-2.60	0.0102
time	id 11	4.5078	0.9642	144	4.68	<.0001
Intercept	id 12	-5.2793	5.5353	144	-0.95	0.3418
time	id 12	-1.9822	0.9642	144	-2.06	0.0416
Intercept	id 13	17.2105	5.5353	144	3.11	0.0023
time	id 13	0.3382	0.9642	144	0.35	0.7263
Intercept	id 14	-21.0342	5.5353	144	-3.80	0.0002
time	id 14	-3.5899	0.9642	144	-3.72	0.0003
Intercept	id 15	-0.3496	5.5353	144	-0.06	0.9497
time	id 15	-2.1149	0.9642	144	-2.19	0.0299
Intercept	id 16	2.7790	5.5353	144	0.50	0.6164
time	id 16	-0.8717	0.9642	144	-0.90	0.3674
Intercept	id 17	-10.4520	5.5353	144	-1.89	0.0610
time	id 17	-3.1840	0.9642	144	-3.30	0.0012
Intercept	id 18	1.9323	5.5353	144	0.35	0.7275

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id g v vcorr solution;
run;
```


The GLIMMIX Procedure

Solution for Random Effects						
Effect	Subject	Estimate	Std Err Pred	DF	t Value	Pr > |t|
time	id 18	-3.5986	0.9642	144	-3.73	0.0003
Intercept	id 19	0.2501	5.5353	144	0.05	0.9640
time	id 19	-2.9438	0.9642	144	-3.05	0.0027
Intercept	id 20	11.6831	5.5353	144	2.11	0.0365
time	id 20	2.4104	0.9642	144	2.50	0.0135
Intercept	id 21	17.6954	5.5353	144	3.20	0.0017
time	id 21	2.4517	0.9642	144	2.54	0.0121
Intercept	id 22	-6.6028	5.5353	144	-1.19	0.2349
time	id 22	-2.3801	0.9642	144	-2.47	0.0147
Intercept	id 23	-9.1286	5.5353	144	-1.65	0.1013
time	id 23	-2.7862	0.9642	144	-2.89	0.0045
Intercept	id 24	-16.6960	5.5353	144	-3.02	0.0030
time	id 24	1.5488	0.9642	144	1.61	0.1104

Covariance Matrix for Fixed Effects			
Effect	Row	Col1	Col2
Intercept	1	17.0250	-0.1205
time	2	-0.1205	0.3991

Model 3

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id type=un g v vcorr solution;
run;
```

The GLIMMIX Procedure

Model Information	
Data Set	WORK.DT
Response Variable	fas
Response Distribution	Gaussian
Link Function	Identity
Variance Function	Default
Variance Matrix Blocked By	id
Estimation Technique	Restricted Maximum Likelihood
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
id	24	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Number of Observations Read	192
Number of Observations Used	192

Dimensions	
G-side Cov. Parameters	3
R-side Cov. Parameters	1
Columns in X	2
Columns in Z per Subject	2
Subjects (Blocks in V)	24
Max Obs per Subject	8

Optimization Information	
Optimization Technique	Dual Quasi-Newton
Parameters in Optimization	3
Lower Boundaries	2
Upper Boundaries	0
Fixed Effects	Profiled
Residual Variance	Profiled
Starting From	Data

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	1347.1419655	.	7.68E-13

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id type=un g v vcorr solution;
run;
```

The GLIMMIX Procedure

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Res Log Likelihood	1347.14
AIC (smaller is better)	1355.14
AICC (smaller is better)	1355.36
BIC (smaller is better)	1359.85
CAIC (smaller is better)	1363.85
HQIC (smaller is better)	1356.39
Generalized Chi-Square	5100.67
Gener. Chi-Square / DF	26.85

Estimated G Matrix

Effect	Row	Col1	Col2
Intercept	**1**	405.12	-21.3072
time	**2**	-21.3072	9.2406

Estimated V Matrix for id 1

Row	Col1	Col2	Col3	Col4	Col5	Col6	Col7	Col8
1	398.60	359.68	347.62	335.55	323.48	311.42	299.35	287.28
2	359.68	383.70	354.03	351.21	348.38	345.55	342.73	339.90
3	347.62	354.03	387.29	366.86	373.28	379.69	386.11	392.52
4	335.55	351.21	366.86	409.36	398.17	413.83	429.48	445.14
5	323.48	348.38	373.28	398.17	449.91	447.96	472.86	497.76
6	311.42	345.55	379.69	413.83	447.96	508.95	516.24	550.37
7	299.35	342.73	386.11	429.48	472.86	516.24	586.46	602.99
8	287.28	339.90	392.52	445.14	497.76	550.37	602.99	682.45

Estimated V Correlation Matrix for id 1

Row	Col1	Col2	Col3	Col4	Col5	Col6	Col7	Col8
1	1.0000	0.9197	0.8847	0.8307	0.7639	0.6914	0.6191	0.5508
2	0.9197	1.0000	0.9184	0.8862	0.8385	0.7820	0.7225	0.6642
3	0.8847	0.9184	1.0000	0.9214	0.8942	0.8552	0.8102	0.7635
4	0.8307	0.8862	0.9214	1.0000	0.9278	0.9066	0.8765	0.8422
5	0.7639	0.8385	0.8942	0.9278	1.0000	0.9361	0.9206	0.8983
6	0.6914	0.7820	0.8552	0.9066	0.9361	1.0000	0.9449	0.9339

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id type=un g v vcorr solution;
run;
```

The GLIMMIX Procedure

Estimated V Correlation Matrix for id 1								
Row	**Col1**	**Col2**	**Col3**	**Col4**	**Col5**	**Col6**	**Col7**	**Col8**
7	0.6191	0.7225	0.8102	0.8765	0.9206	0.9449	1.0000	0.9531
8	0.5508	0.6642	0.7635	0.8422	0.8983	0.9339	0.9531	1.0000

Covariance Parameter Estimates			
Cov Parm	**Subject**	**Estimate**	**Standard Error**
UN(1,1)	id	405.12	124.29
UN(2,1)	id	-21.3072	14.3725
UN(2,2)	id	9.2406	2.9144
Residual		26.8457	3.1638

Solutions for Fixed Effects					
Effect	**Estimate**	**Standard Error**	**DF**	**t Value**	**Pr > |t|**
Intercept	30.9301	4.1904	23	7.38	<.0001
time	4.7644	0.6416	23	7.43	<.0001

Type III Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
time	1	23	55.14	<.0001

Solution for Random Effects						
Effect	**Subject**	**Estimate**	**Std Err Pred**	**DF**	**t Value**	**Pr > |t|**
Intercept	id 1	-0.2810	5.6099	144	-0.05	0.9601
time	id 1	2.5795	0.9764	144	2.64	0.0092
Intercept	id 2	-15.3552	5.6099	144	-2.74	0.0070
time	id 2	-1.5193	0.9764	144	-1.56	0.1219
Intercept	id 3	9.0445	5.6099	144	1.61	0.1091
time	id 3	1.6035	0.9764	144	1.64	0.1027
Intercept	id 4	-17.9997	5.6099	144	-3.21	0.0016
time	id 4	3.3559	0.9764	144	3.44	0.0008
Intercept	id 5	66.2155	5.6099	144	11.80	<.0001
time	id 5	-4.2483	0.9764	144	-4.35	<.0001
Intercept	id 6	-27.8007	5.6099	144	-4.96	<.0001
time	id 6	5.9585	0.9764	144	6.10	<.0001

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id type=un g v vcorr solution;
run;
```


The GLIMMIX Procedure

Solution for Random Effects

Effect	Subject	Estimate	Std Err Pred	DF	t Value	Pr > |t|
Intercept	id 7	-14.4408	5.6099	144	-2.57	0.0111
time	id 7	2.9761	0.9764	144	3.05	0.0027
Intercept	id 8	-5.1725	5.6099	144	-0.92	0.3581
time	id 8	1.0453	0.9764	144	1.07	0.2862
Intercept	id 9	8.0169	5.6099	144	1.43	0.1552
time	id 9	2.3858	0.9764	144	2.44	0.0158
Intercept	id 10	29.7506	5.6099	144	5.30	<.0001
time	id 10	-1.9132	0.9764	144	-1.96	0.0520
Intercept	id 11	-14.9162	5.6099	144	-2.66	0.0087
time	id 11	4.6027	0.9764	144	4.71	<.0001
Intercept	id 12	-5.2112	5.6099	144	-0.93	0.3545
time	id 12	-1.9870	0.9764	144	-2.03	0.0437
Intercept	id 13	17.4183	5.6099	144	3.10	0.0023
time	id 13	0.2870	0.9764	144	0.29	0.7692
Intercept	id 14	-21.0652	5.6099	144	-3.76	0.0003
time	id 14	-3.5619	0.9764	144	-3.65	0.0004
Intercept	id 15	-0.2058	5.6099	144	-0.04	0.9708
time	id 15	-2.1368	0.9764	144	-2.19	0.0303
Intercept	id 16	2.8776	5.6099	144	0.51	0.6088
time	id 16	-0.8900	0.9764	144	-0.91	0.3635
Intercept	id 17	-10.3691	5.6099	144	-1.85	0.0666
time	id 17	-3.1853	0.9764	144	-3.26	0.0014
Intercept	id 18	2.2110	5.6099	144	0.39	0.6941
time	id 18	-3.6439	0.9764	144	-3.73	0.0003
Intercept	id 19	0.4602	5.6099	144	0.08	0.9347
time	id 19	-2.9766	0.9764	144	-3.05	0.0027
Intercept	id 20	11.6711	5.6099	144	2.08	0.0393
time	id 20	2.3993	0.9764	144	2.46	0.0152
Intercept	id 21	17.7613	5.6099	144	3.17	0.0019
time	id 21	2.4220	0.9764	144	2.48	0.0143
Intercept	id 22	-6.5245	5.6099	144	-1.16	0.2467
time	id 22	-2.3849	0.9764	144	-2.44	0.0158
Intercept	id 23	-9.0558	5.6099	144	-1.61	0.1087
time	id 23	-2.7873	0.9764	144	-2.85	0.0049

```
proc glimmix data=stroke;
class id;
model fas=time / dist=normal covb solution;
random int time / subject=id type=un g v vcorr solution;
run;
```


The GLIMMIX Procedure

Solution for Random Effects						
Effect	**Subject**	**Estimate**	**Std Err Pred**	**DF**	**t Value**	**Pr > |t|**
Intercept	id 24	-17.0294	5.6099	144	-3.04	0.0028
time	id 24	1.6189	0.9764	144	1.66	0.0995

Covariance Matrix for Fixed Effects			
Effect	**Row**	**Col1**	**Col2**
Intercept	**1**	17.5593	-1.0076
time	**2**	-1.0076	0.4117