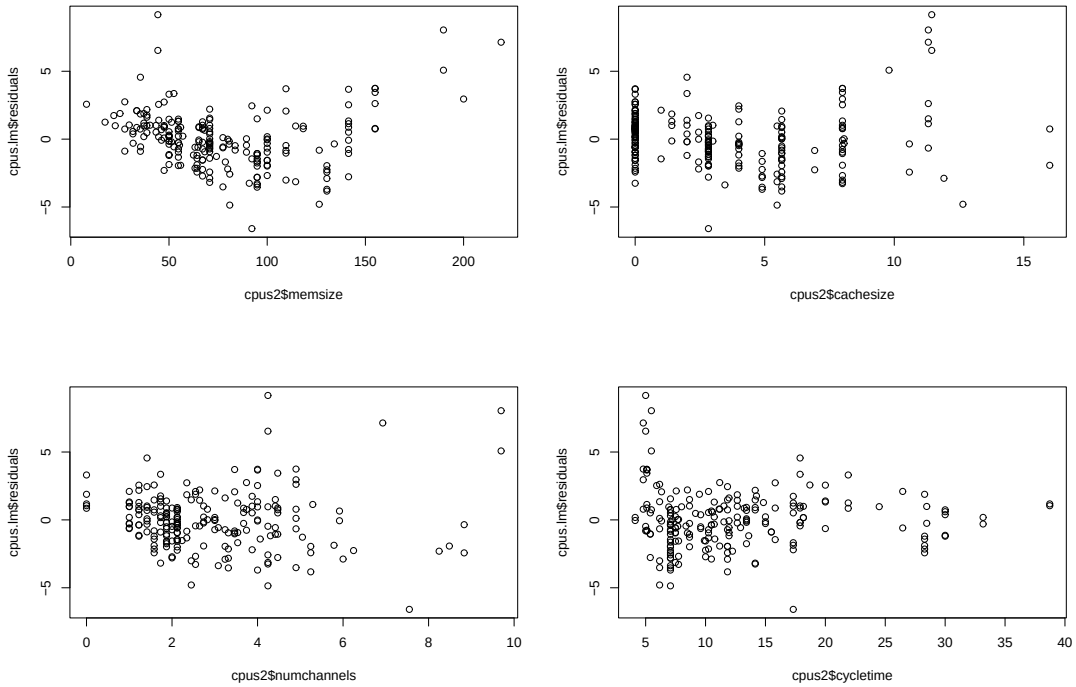
Explain performance in terms of four characteristics, n=209 CPUs

```
# preliminary transformations -
# original variables all have long right tails

library(``MASS'')
cpus2 <- data.frame(
          perf=sqrt(cpus$perf),
          memsize=sqrt((cpus$mmin+cpus$mmax)/2),
          cachesize=sqrt(cpus$cach),
          numchannels=sqrt((cpus$chmin+cpus$chmax)/2),
          cycletime=sqrt(cpus$syct))
```

Try linear model

```
cpus.lm <- lm(perf ~ memsize + cachesize +
                numchannels + cycletime, data=cpus2)
```

Residuals versus preditors

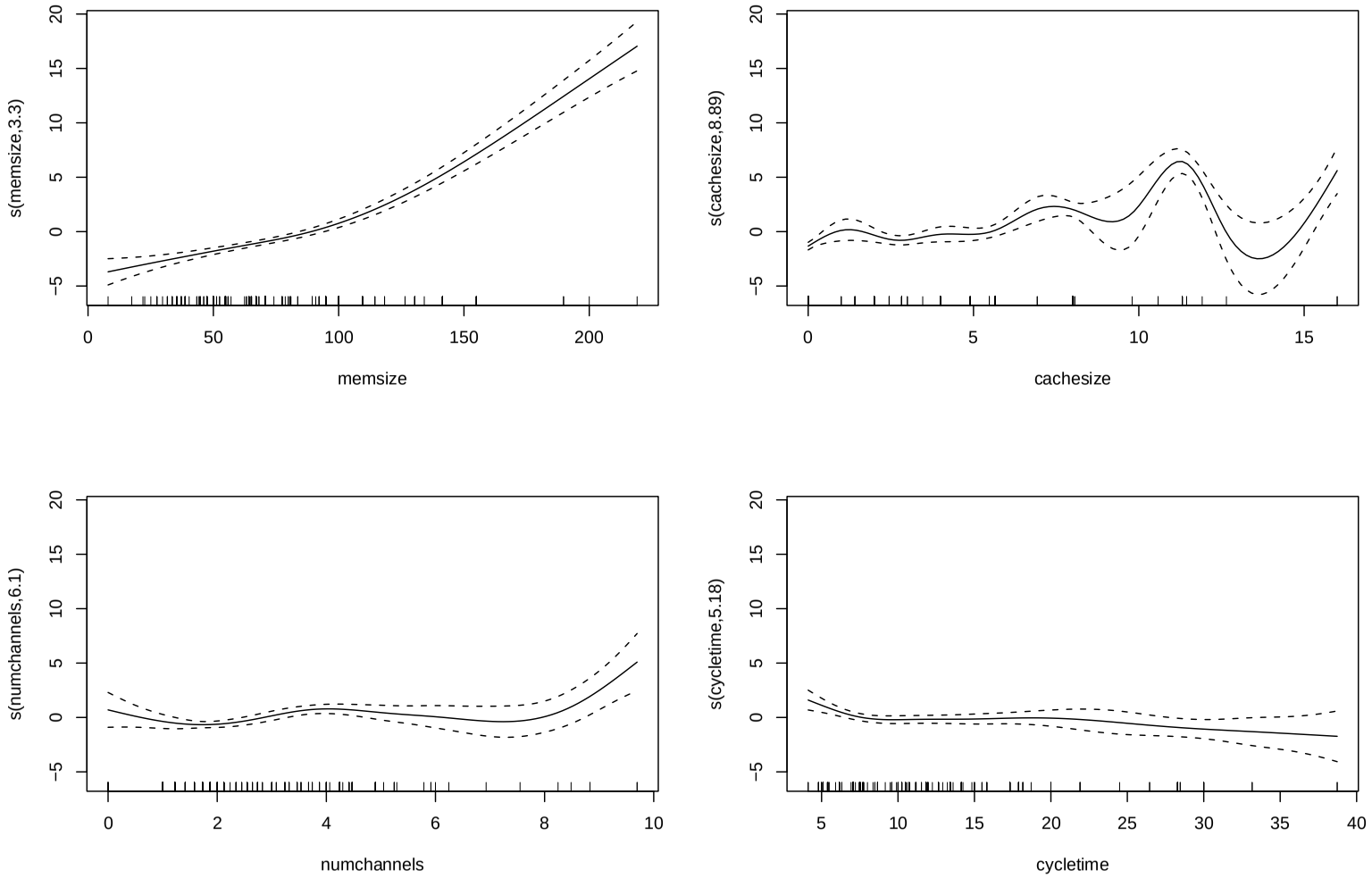


Now try additive model

```
> library(``mgcv'')
> cpus.am <- gam(perf~s(memsize)+s(cachesize)+
                       s(numchannels)+s(cycletime),
                 data=cpus2)

> summary(cpus.am)
Family: gaussian
Link function: identity
Formula:
perf ~ s(memsize) + s(cachesize) + s(numchannels) +
       s(cycletime)

Parametric coefficients:
             Estimate  std. err.    t ratio    Pr(>|t|)
(Intercept)    8.7308     0.0954      91.52    < 2.22e-16
```

```
Approximate significance of smooth terms:
                      edf       chi.sq     p-value
    s(memsize)      3.299        376.5     < 2.22e-16
  s(cachesize)      8.891       199.74     < 2.22e-16
s(numchannels)      6.096       45.903     3.6473e-06
  s(cycletime)      5.177       24.626     0.0050775

R-sq.(adj) =  0.936   Deviance explained = 94.3%
GCV score = 2.1544   Scale est. = 1.9022    n = 209
```

```
> plot(cpus.am)
```


s(memsize,3.3)
memsize
s(cachesize,8.89)
cachesize
s(numchannels,6.1)
numchannels
s(cycletime,5.18)
cycletime

Want something smoother?

```
> cpus.am2 <- gam(perf ~ s(memsize,k=4,fx=T) +
                         s(cachesize,k=4,fx=T) +
                         numchannels +
                         s(cycletime,k=4,fx=T),
                  data=cpus2)

> summary(cpus.am2)

Family: gaussian
Link function: identity

Parametric coefficients:
              Estimate  std. err.    t ratio    Pr(>|t|)
(Intercept)     7.7403     0.2864      27.02    < 2.22e-16
numchannels    0.33988    0.09059      3.752    0.00023042
```

```
Approximate significance of smooth terms:
                    edf        chi.sq     p-value
  s(memsize)          3        355.77     < 2.22e-16
s(cachesize)          3         120.7     < 2.22e-16
s(cycletime)          3        5.1098     0.16763

R-sq.(adj) =  0.913   Deviance explained = 91.7%
GCV score = 2.7259   Scale est. = 2.5824    n = 209
```

```
> plot(cpus.am2)
```