Empirical exercise – The likelihood function and the probit model

This function accepts the observed data for `y` and `X` as input arguments, and returns as output the value of the log-likelihood function at the maximising values of the parameter vector `B_true`. The function does not specify an analytical solution for the gradient. Therefore, we force `fminunc` to use numerical approximations of the gradient. The price we pay is that the algorithm can get stuck in some regions of the parameter space, and fail to converge.

```
function Obj = exercisemlprofunction(y,X,B_true);
d = 2*y-1; If y = 1, d = 1.  If y = 0, d = -1.
% The likelihood function
likelihood = normcdf(d.*(X*B_true)); P(y == 1) = F(X*B_true), P(y == 0) = F(-X*B_true).
% The loglikelihood function
loglikelihood_N_obs = log(likelihood);
% The objective function
Obj = -sum(loglikelihood_N_obs);
end
```