

# IntermediateProblemAnswers

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## 0.1 Metaprogramming Project

```
In [1]: macro ~(y,ex)
    new_ex = Meta.quot(ex)
    quote
        inner_ex = $(esc(new_ex))
        data_name = Symbol(string(inner_ex.args[end])[1])
        eval_ex = Expr(:(=), :data, data_name)
        eval(Main, eval_ex)
        new_X = Matrix{Float64}(size(data,1), length(inner_ex.args)-1)
        cur_spot = 0
        for i in 2:length(inner_ex.args)
            if inner_ex.args[i] == 1
                new_X[:,i-1] = ones(size(data,1))
            else
                col = parse{Int}(string(string(inner_ex.args[i])[2]))
                new_X[:,i-1] = data[:,col]
            end
        end
        $(esc(y)), new_X
    end
end

y = rand(10)
X = rand(10,4)
y~1+X1+X2+X4

function solve_least_squares(y,X)
    X\y
end

solve_least_squares(tup::Tuple) = solve_least_squares(tup...)
solve_least_squares(y~1+X1+X2+X4)

Out[1]: 4-element Array{Float64,1}:
 0.153788
 0.742984
-0.268836
 0.320996
```

## 0.2 Distribution Dispatch Problem

This is from Josh Day's talk: <https://www.youtube.com/watch?v=EwcTNzpQ6Sc>

Solution is from: [https://github.com/joshday/Talks/blob/master/SLG2016\\_IntroToJulia/Slides.ipynb](https://github.com/joshday/Talks/blob/master/SLG2016_IntroToJulia/Slides.ipynb)

```
In [ ]: function myquantile(d::UnivariateDistribution, q::Number)
     $\theta$  = mean(d)
    tol = Inf
    while tol > 1e-5
         $\theta$ old =  $\theta$ 
         $\theta$  =  $\theta$  - (cdf(d,  $\theta$ ) - q) / pdf(d,  $\theta$ )
        tol = abs( $\theta$ old -  $\theta$ )
    end
     $\theta$ 
end

for dist in [Gamma(5, 1), Normal(0, 1), Beta(2, 4)]
    @show myquantile(dist, .75)
    @show quantile(dist, .75)
    println()
end
```