9.

```
using Printf
function romberg(f::Function, xlim, n, ϵ)
    a, b = xlim
    h = b - a
    T = zeros(n, n)
    T[1, 1] = 1 / 2 * h * (f(a) + f(b))
    for i = 1:n
        tmpsum = 0
        jmax = 2^(i - 1)
        for j = 1:jmax
            tmpsum += f(a + (j - 1 / 2) * h)
        end
        T[i+1, 1] = 1 / 2 * T[i, 1] + 1 / 2 * h * tmpsum
        for m = 1:i
            T[i+1, m+1] = (4^m * T[i+1, m] - T[i, m]) / (4^m - 1)
        end
        for m = 1:i
            @printf("%12.9f\t", T[i, m])
        end
        @printf("\n")
        if i > 1 && abs(T[i+1, i+1] - T[i, i]) < ϵ
            @printf("Accuracy requirement satisfied.\n\n")
            break
        end
        h /= 2
    end
end
```

```
f(x) = 2 / sqrt(pi) * exp(-x)
ϵ = 1e-6
xlim = 0, 1
romberg(f, xlim, 20, ϵ)
f(x) = exp(-x^2)
ϵ = 1e-6
xlim = 0, 0.8
romberg(f, xlim, 20, ϵ)
```

```
Problem 9.1
 0.771743332
 0.728069946     0.713512151
 0.716982762     0.713287034     0.713272026
Accuracy requirement satisfied.
Problem 9.2
 0.610916970
 0.646316000     0.658115677
 0.654851153     0.657696204     0.657668239
 0.656966396     0.657671477     0.657669829     0.657669854
Accuracy requirement satisfied.
```

- 9.1，取 $I = 0.713272026$
- 9.2，取$I = 0.657669854$