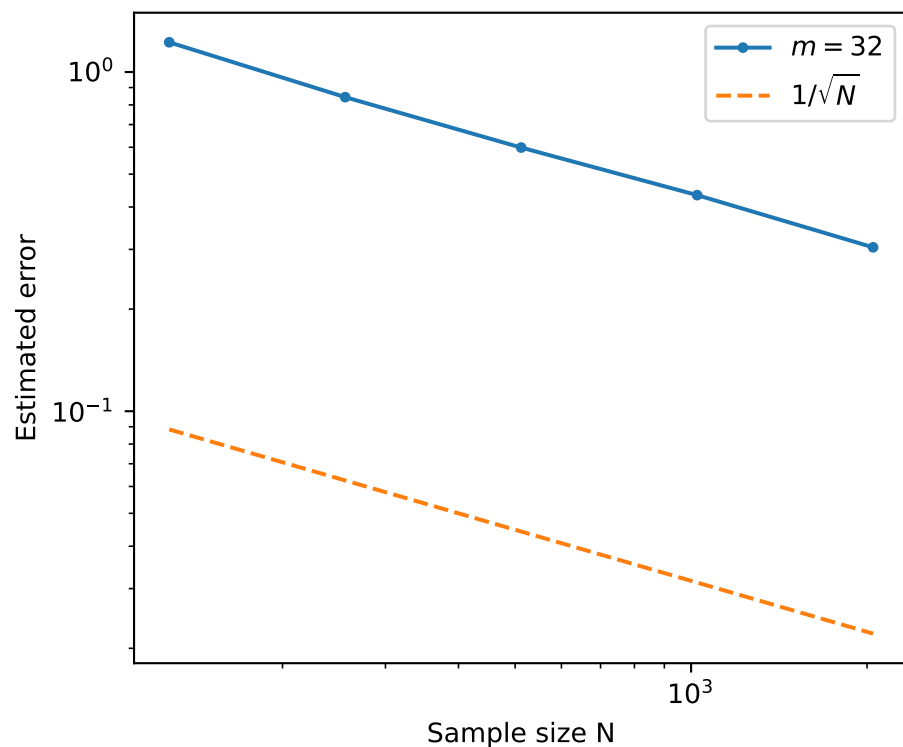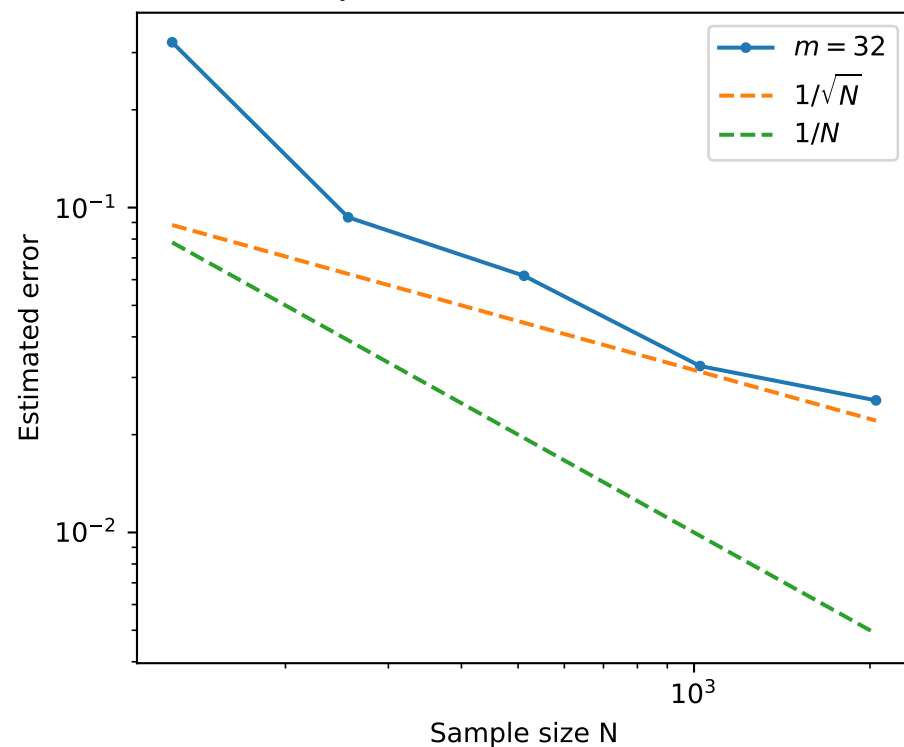Goal 2: With pre-integration, estimated error with confidence $1 - 0.01$