

## Problem Set #2

(1) Stock and Watson, 2.2

(2) Stock and Watson, 2.8

(3) Stock and Watson, 2.10

(4) Show that

$$\text{Cov}(aX + b, cY + d) = ac\text{Cov}(X, Y)$$

for any two random variables  $X$  and  $Y$ , and constants  $a, b, c$  and  $d$ .

(*Hint:* Use the formula for the covariance in your class notes. A similar derivation is also provided in the appendix of Chapter 2.)

(5) Show that  $\text{Var}(aX + Y) = a^2\text{Var}(X) + 2a\text{Cov}(X, Y) + \text{Var}(Y)$  for any two random variables  $X$  and  $Y$ , and constants  $a$  and  $b$ .

(6) Consider the following two estimators of a parameter  $\theta$ , and let  $n$  denote the sample size:

(a)

$$\hat{\theta} = \theta + (1/n)$$

(b)

$$\hat{\theta} = \begin{cases} \theta + n & \text{With probability } .5 \\ \theta - n & \text{With probability } .5 \end{cases}$$

Are these estimators biased or unbiased? Are they consistent or inconsistent?.