

Name (print neatly): A. Student

Score: 20/20

Quiz 4: Tuesday, February 10, 2014

good!

To receive full credit, show all work necessary to justify answers and all steps of solutions and derivations clearly, in logical sequence, using notation developed in class. Partial credit will be given only for significant progress toward a solution.

1. A fund accumulates at a nominal rate of interest of 6% convertible quarterly (so $i^{(4)} = 0.06$). Round each answer to the nearest ten-thousandth (4 decimal places).

(a) Find i , the equivalent effective annual rate of interest.

$$1+i = \left[1 + \frac{i^{(m)}}{m}\right]^m$$

$$1+i = \left[1 + \frac{.06}{4}\right]^4$$

$$1+i = (1.015)^4$$

$$i = (1.015)^4 - 1$$

$$i = .0614 \quad \checkmark$$

(b) Find $i^{(12)}$, the equivalent nominal rate of interest convertible monthly.

$$1+i = \left[1 + \frac{i^{(m)}}{m}\right]^m$$

$$1+.0614 = \left[1 + \frac{i^{(12)}}{12}\right]^{12}$$

$$1.0614 = \left[1 + \frac{i^{(12)}}{12}\right]^{12}$$

$$(1.0614)^{1/12} = 1 + \frac{i^{(12)}}{12}$$

$$12 \left[(1.0614)^{1/12} - 1 \right] = i^{(12)}$$

$$i^{(12)} = .0597 \quad \checkmark$$

(c) Find $d^{(2)}$, the equivalent nominal rate of discount convertible semiannually.

$$1-d = \left[1 - \frac{d^{(m)}}{m}\right]^m$$

$$1+i = \frac{1}{1-d} \quad 1-d = \frac{1}{1+i} \quad 1 - \frac{1}{1+i} = d$$

$$d = \frac{i}{1+i} = \frac{.0614}{1.0614} = .0578$$

$$.9422 = \left[1 - \frac{d^{(2)}}{2}\right]^2$$

$$(.9422)^{1/2} = 1 - \frac{d^{(2)}}{2}$$

$$d^{(2)} = .0587 \quad \checkmark$$

$$2 \left[1 - (.9422)^{1/2} \right] = d^{(2)} \quad \checkmark$$

(d) Find δ , the equivalent force of interest.

$$\delta = \frac{a'(t)}{a(t)} = \frac{d}{dt} \ln(a(t))$$

(Known: $e^\delta = 1+i$)

$$\delta = \ln(1+i)$$

$$\delta = \ln(1+.0614)$$

$$\delta = .0596 \quad \checkmark$$