Frame A:

Cash receipt at the END of year ...

```
time |  0     1     2     3     4     5     6     7     8     9    10
_____|__|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
 $   |  ^           ^     R     R     R     R     R     ^           ^
        |           |     ^                           ^     |           |
       (a)         (b)   (c)                         (d)   (e)         (f)
```

Frame B:

Cash receipt at the END of year ...

```
time |  0     1     2     3     4     5     6     7     8     9    10
_____|__|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
 $   |  ^           ^     R     R           R     R     ^           ^
        |           |     ^                           ^     |           |
       (g)         (h)   (i)                         (j)   (k)         (l)
```

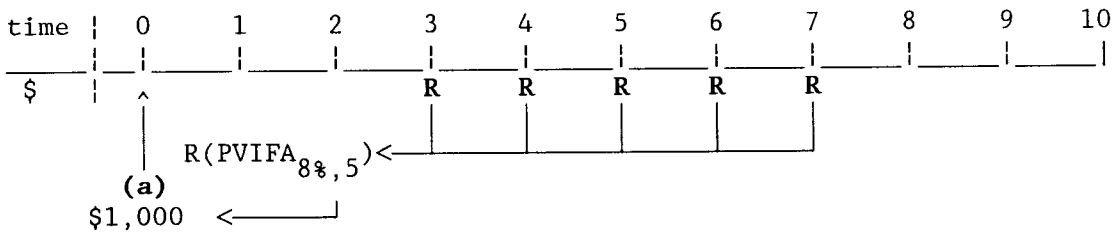
1. Assume that the time lines in Frames A and B (above) depict annual cash flows of **R dollars** at the ends of the periods indicated. If the appropriate compound annual interest rate is 8 percent, what dollar value does R take on if the **present value** of the cash flow stream depicted in Frame A or Frame B equals $1,000 as of point (a)? point (b)? point (c)? point (g)? point (h)? point (i)?

2. Assume that the time lines in Frames A and B (above) depict annual cash flows of **R dollars** at the ends of the periods indicated. If the appropriate compound annual interest rate is 8 percent, what dollar value does R take on if the **future value** of the cash flow stream depicted in Frame A or Frame B equals $1,000 as of point (d)? point (e)? point (f)? point (j)? point (k)? point (l)?

Answers:

Question 1 -- When the present value of the cash flow stream depicted in Frame A or Frame B equals $1,000 at point _____, R equals _____.
(a), $292.23; (b), $250.44; (c), $231.91; (g), $364.83; (h), $312.60; (i), $289.44

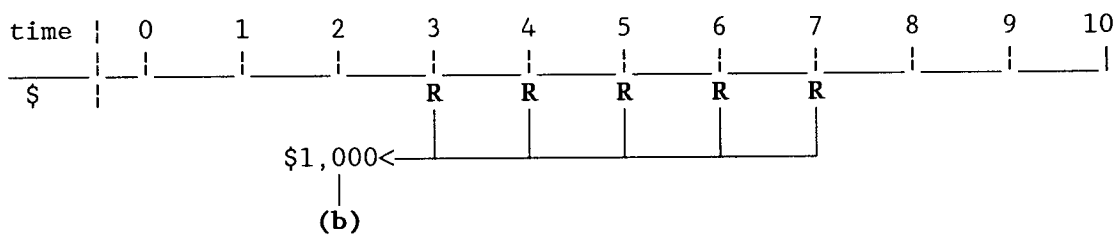
Question 2 -- When the future value of the cash flow stream depicted in Frame A or Frame B equals $1,000 at point _____, R equals _____.
(d), $170.44; (e), $157.83; (f), $135.28; (j), $212.72; (k), $197.01; (l), $168.83



$$\$1{,}000 = R(PVIFA_{8\%,5}) \times (PVIF_{8\%,2})$$

$$\$1{,}000 = R(3.993) \times (.857) = R(3.422)$$

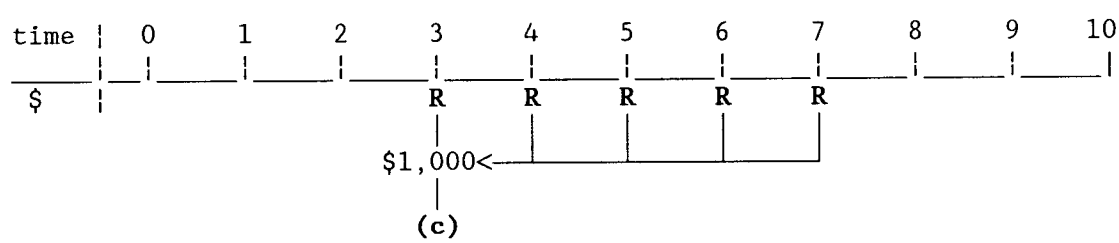
R = $1,000/3.422 = **$292.23** when the present value of the cash flow stream equals $1,000 at point (a)



$$\$1{,}000 = R(PVIFA_{8\%,5})$$

$$\$1{,}000 = R(3.993)$$

R = $1,000/3.993 = **$250.44** when the present value of the cash flow stream equals $1,000 at point (b)



$$\$1{,}000 = R + R(PVIFA_{8\%,4})$$

$$\$1{,}000 = R + R(3.312) = R(4.312)$$

R = $1,000/4.312 = **$231.91** when the present value of the cash flow stream equals $1,000 at point (c)

```
time | 0     1     2     3     4     5     6     7     8     9     10
_____|__|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
 $   |                   R     R     R     R     R
                         |_____|_____|_____|_____|_____>
                                                     $1,000
                                                       (d)
```

$1,000 = R(FVIFA$_{8\%,5}$) = R(5.867)

R = $1,000/5.867 = **$170.44** when the future value of the cash flow stream equals $1,000 at point (d)

```
time | 0     1     2     3     4     5     6     7     8     9     10
_____|__|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
 $   |                   R     R     R     R     R
                         |_____|_____|_____|_____|_____>$1,000
                                                         |
                                                         (e)
```

$1,000 = R(FVIFA$_{8\%,5}$) x (1.08)

$1,000 = R(5.867) x (1.08) = R(6.336)

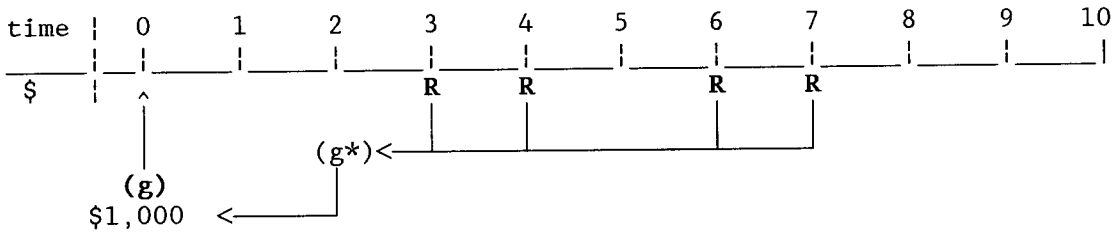
R = $1,000/6.336 = **$157.83** when the future value of the cash flow stream equals $1,000 at point (e)

```
time | 0     1     2     3     4     5     6     7     8     9     10
_____|__|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
 $   |                   R     R     R     R     R
                         |_____|_____|_____|_____>R(FVIFA8%,5)
                                                 |
                                                 |_____>$1,000
                                                         |
                                                         (f)
```

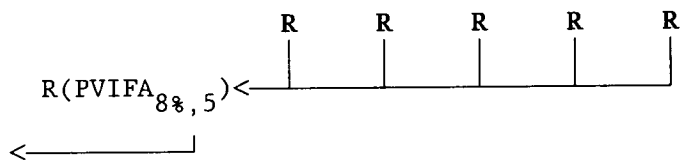
$1,000 = R(FVIFA$_{8\%,5}$) x (FVIF$_{8\%,3}$)

$1,000 = R(5.867) x (1.260) = R(7.392)

R = $1,000/7.392 = **$135.28** when the future value of the cash flow stream equals $1,000 at point (f)



The above pattern is equivalent to



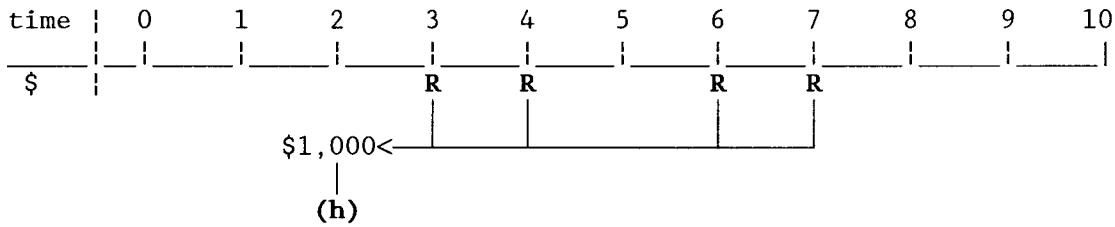
minus

$$\$1,000 = [R(PVIFA_{8\%,5}) \times (PVIF_{8\%,2})] - R(PVIF_{8\%,5})$$

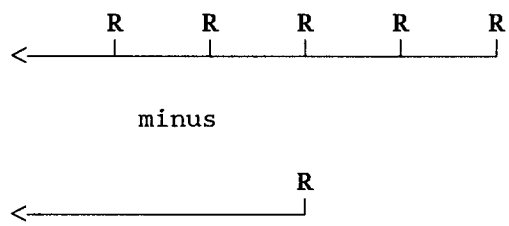
$$\$1,000 = [R(3.993) \times (.857)] - R(.681)$$

$$\$1,000 = R(3.422) - R(.681) = R(2.741)$$

$R = \$1,000/2.741 =$ **$364.83** when the present value of the cash flow stream equals $1,000 at point (g)



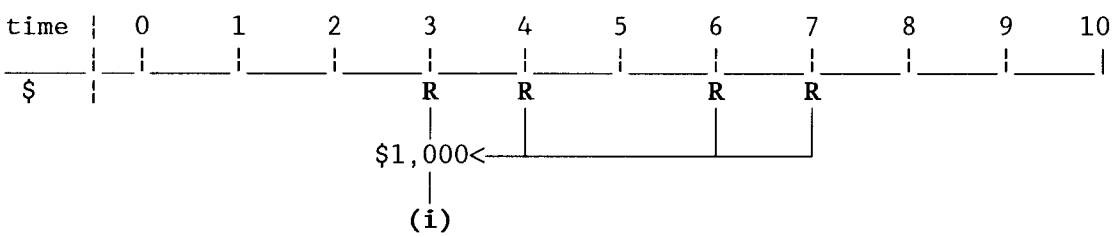
The above pattern is equivalent to



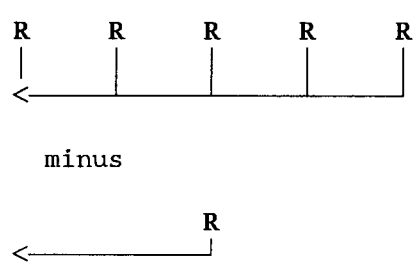
$\$1,000 = R(PVIFA_{8\%,5}) - R(PVIF_{8\%,3})$

$\$1,000 = R(3.993) - R(.794) = R(3.199)$

$R = \$1,000/3.199 =$ **<u>$312.60</u>** when the present value of the cash flow stream equals $1,000 at point (h)



The above pattern is equivalent to



$\$1,000 = R + R(PVIFA_{8\%,4}) - R(PVIF_{8\%,2})$

$\$1,000 = R + R(3.312) - R(.857) = R(3.455)$

$R = \$1,000/3.455 =$ **<u>$289.44</u>** when the present value of the cash flow stream equals $1,000 at point (i)

```
time |  0     1     2     3     4     5     6     7     8     9    10
_____|__|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
 $   |                    R     R           R     R
                           |     |           |     |
                           |_____|___________|_____>
                                                 $1,000
                                                   (j)
```

The above pattern is equivalent to

```
R     R     R     R     R
|     |     |     |     |
|_____|_____|_____|_____>
```

minus

```
R
|
|_____>
```

$$\$1{,}000 = R(FVIFA_{8\%,5}) - R(FVIF_{8\%,2})$$

$$\$1{,}000 = R(5.867) - R(1.166) = R(4.701)$$

$R = \$1{,}000/4.701 =$ **<u>$212.72</u>** when the future value of the cash flow stream equals $1,000 at point (j)

```
time |  0     1     2     3     4     5     6     7     8     9    10
     |__|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
 $   |                     R     R           R     R
                            |     |           |     |
                            |_____|___________|_____|_____>$1,000
                                                          |
                                                         (k)
```

The above pattern is equivalent to

```
R     R     R     R     R
|     |     |     |     |
|_____|_____|_____|_____|_____>
```

minus

```
R
|
|_____>
```

$$\$1{,}000 = [R(FVIFA_{8\%,5}) \times (1.08)] - R(FVIF_{8\%,3})$$

$$\$1{,}000 = [R(5.867) \times (1.08)] - R(1.260)$$

$$\$1{,}000 = R(6.336) - R(1.260) = R(5.076)$$

R = \$1,000/5.076 = **<u>\$197.01</u>** when the future value of the cash flow stream equals \$1,000 at point (k)

```
time | 0     1     2     3     4     5     6     7     8     9     10
_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
 $   |                 R     R           R     R
                       |     |           |     |
                       |_____|___________|_____>(1*)
                                                |
                                                |_____________>$1,000
                                                                  |
                                                                 (1)
```

The above pattern is equivalent to

```
R     R     R     R     R
|     |     |     |     |
|_____|_____|_____|_____>R(FVIFA8%,5)
                        |
                        |_____________>
```

minus

```
R
|
|_____________________________>
```

$$\$1,000 = [R(FVIFA_{8\%,5}) \times (FVIF_{8\%,3})] - R(FVIF_{8\%,5})$$

$$\$1,000 = [R(5.867) \times (1.260)] - R(1.469)$$

$$\$1,000 = R(7.392) - R(1.469) = R(5.923)$$

R = \$1,000/5.923 = **<u>\$168.83</u>** when the future value of the cash flow stream equals \$1,000 at point (1)