

MCQ 3u Culminating Practice from text

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$$FF: y = a(x-s)(x-t)$$

10c) V(-1, 4)

$$4 = a(-1+3)(-1-1)$$

$$4 = a(2)(-2)$$

zeros (-3, 0)  
(1, 0)

$$\frac{4}{-4} = \frac{-4a}{-4}$$

$$a = -1$$

$$\therefore y = -1(x+3)(x-1)$$

OR

$$VF: y = a(x-h)^2 + k$$

$$0 = a(1+1)^2 + 4$$

$$-4 = a(2)^2$$

$$\frac{-4}{4} = \frac{4a}{4}$$

$$-1 = a$$

$$\therefore y = -1(x+1)^2 + 4$$

To get SF, expand and simplify

$$\begin{aligned} y &= -1(x+3)(x-1) \\ y &= -1(x^2+2x-3) \\ y &= -x^2-2x+3 \end{aligned}$$

$$\begin{aligned} y &= -1(x+1)^2 + 4 \\ y &= -1(x^2+2x+1) + 4 \\ y &= -x^2-2x-1+4 \\ y &= -x^2-2x+3 \end{aligned}$$

MCR 3U Culminating Practice from text

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8.  $h(t) = -5t^2 + 20t + 50$

a)  $t = -\frac{20}{-10} = 2$        $h(2) = -5(2)^2 + 20(2) + 50 = 70$        $\therefore$  max height is 70m at  $t = 2$ s

b)  $h(0) = 50$   
 $t = 2$

c) the rooftop is 50m high ( $h(0) = 50$  or y-intercept is 50)

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13.  $h(t) = -4.9t^2 + 92t + 9$

a)  $150 = -4.9t^2 + 92t + 9$   
 $0 = -4.9t^2 + 92t - 141$

b) above 150m for  
 $t = 17.09 - 1.68$   
 $t = 15.41$  seconds

$$t = \frac{-92 \pm \sqrt{92^2 - 4(-4.9)(-141)}}{2(-4.9)}$$

$$t = \frac{-92 \pm \sqrt{5700.4}}{-9.8}$$

$$t = \frac{-92 + \sqrt{5700.4}}{-9.8}$$

$$t = 1.68 \text{ s}$$

$$t = \frac{-92 - \sqrt{5700.4}}{-9.8}$$

$$t = 17.09 \text{ s}$$



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#4a)  $s = -4$   
 $t = 3$   
pt  $(2, 7)$

$$y = a(x-s)(x-t)$$
$$7 = a(2+4)(2-3)$$
$$7 = a(6)(-1)$$
$$\frac{7}{-6} = \frac{-6a}{-6}$$
$$a = \frac{-7}{6}$$

$$\therefore y = \frac{-7}{6}(x+4)(x-3)$$

5a)  $v(-2, 5)$   
pt  $(4, -8)$

$$y = a(x-h)^2 + k$$
$$-8 = a(4+2)^2 + 5$$
$$-13 = a(6)^2$$
$$\frac{-13}{36} = \frac{36a}{36}$$
$$a = \frac{-13}{36}$$

$$\therefore y = \frac{-13}{36}(x+2)^2 + 5$$

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$$P(t) = 45000(1.03)^t$$

↑ final pop<sup>n</sup>      ↑ initial pop<sup>n</sup>      ← growth rate      # of years since 1990

b) 2007-1990       $P(17) = 45000(1.03)^{17}$   
= 17 ∴ t = 17      = 74378 people

c)  $\frac{90000}{45000} = \frac{45000(1.03)^t}{45000}$   
 $2 = 1.03^t$   
 $t = \frac{\log 2}{\log 1.03}$   
 $t = 23.4 \text{ yrs.}$

∴ In 2013 (almost halfway through) the pop<sup>n</sup> will have doubled.

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5a)  $\frac{4494.40}{4240} = \frac{4240(1 + \frac{i}{1})^1}{4240}$

$$1.06 = 1 + i$$

∴ i = 0.06 ∴ 6% / a compounded annually

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4.  $PV = 12033.52(1.072)^{-5}$   
= 8500

8.  $\frac{6000}{2500} = \frac{2500(1 + \frac{i}{4})^{4 \times 10}}{2500}$   
 $2.4 = (1 + \frac{i}{4})^{40}$

$$\left[ (2.4)^{1/40} - 1 \right] \times 4 = i$$

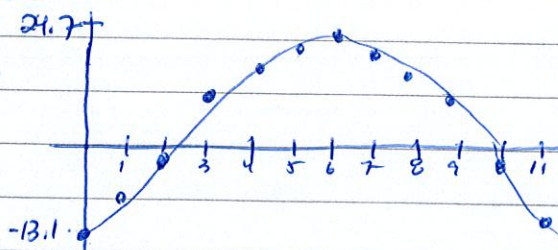
$$i = 0.0885$$

∴ 8.85% / a  
Compounded quarterly



ps 405

11.a)



Jan = 0

\* Bad scatterplot!!  
(should use graph paper, scale, ruler, etc to be more accurate)

b) periodic since the pattern of temperatures will repeat

c) max 24.7  
min -13.1

$$d) K = 360 \div 12$$

$$K = 30^\circ$$

the period of the data  
is 12  $\rightarrow$  repeats every  
12 months

$$e) d = \frac{24.7 + (-13.1)}{2}$$

$$d = 5.8$$

f)  $b = 6$  (6 to the right  
for positive cosine)

$$a = \frac{24.7 - (-13.1)}{2}$$

$$a = 18.9$$

$$g) T(t) = 18.9 \cos(30(t-6)) + 5.8$$

test (1-9)  $T(1) = 18.9 \cos(30(1-6)) + 5.8$   
 $= -10.6$  close

$$h) T(38) = 18.9 \cos(30(38-6)) + 5.8$$

$$= -3.65^\circ\text{C}$$

month 38 would be march (2 yrs later)  
march has a temp of  $-1.1^\circ\text{C}$  from the table  $\therefore$  makes sense

i) when would the temp be  $10^\circ\text{C}$ ?

$$10 = 18.9 \cos(30(t-6)) + 5.8$$

$$\frac{4.2}{18.9} = \frac{18.9 \cos(30(t-6))}{18.9}$$

part way through  
~~August~~ September  
the temp  
should be  $10^\circ\text{C}$ .

$$\left[ \cos^{-1} \left( \frac{4.2}{18.9} \right) \div 30 \right] + 6 = t$$

$$t = 8.57$$



## Financial Applications Practice

$$1. \quad FV = 750 \times \frac{\left(1 + \frac{0.08}{4}\right)^{4 \times 10} - 1}{\frac{0.08}{4}}$$
$$= \$45,301.49$$

$$3. \quad PV = 25000 \left(1 + \frac{0.08}{12}\right)^{-12 \times 15}$$
$$= \$7,559.90$$

$$5. \quad \frac{3312.06}{1500} = \frac{1500 \left(1 + \frac{i}{4}\right)^{40}}{1500}$$

$$2.20804 = \left(1 + \frac{i}{4}\right)^{40}$$

$$\left[\left(2.20804\right)^{1/40} - 1\right] \times 4 = i$$

$$i = 0.08 \quad \therefore 8\% \text{ /a comp. quarterly}$$

$$7. \quad FV = 450 \times \frac{\left(1 + \frac{0.075}{4}\right)^{4 \times 17} - 1}{\frac{0.075}{4}}$$
$$= \$6,0880.81$$