

Solutions to Assignment #3
 201-943-DW
 Applied mathematics
 Oct 29th 2014

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 of 36

Section 3.4

#21 $y = x^2 - 3x + 1$

vertex

$x = +3/2 \quad (-b/2a)$

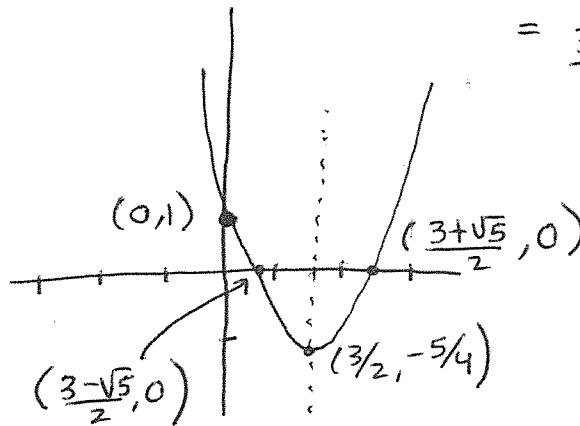
$y = (3/2)^2 - 3(3/2) + 1$
 $= 9/4 - 9/2 + 1$
 $= 9/4 - 18/4 + 4/4$
 $= -5/4$

vertex: $(3/2, -5/4)$

y-intercept
 $(0, 1)$

x-intercepts

$0 = x^2 - 3x + 1$
 $x = \frac{3 \pm \sqrt{9-4}}{2}$
 $= \frac{3 \pm \sqrt{5}}{2}$



(5 MARKS)

#22 $y = 2 + 3x + x^2$

vertex

$x = -3/2$

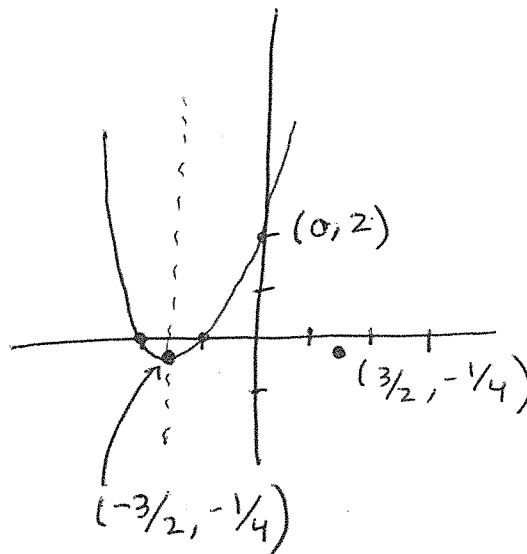
$y = 2 + 3(-3/2) + (-3/2)^2$
 $= 2 - 9/2 + 9/4$
 $= 8/4 - 18/4 + 9/4$
 $= -1/4$

vertex $(-3/2, -1/4)$

y-intercept
 $(0, 2)$

x-intercepts

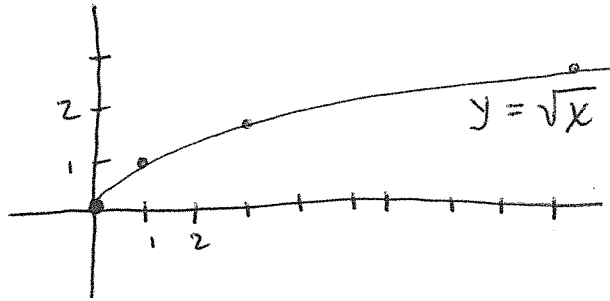
$0 = 2 + 3x + x^2$
 $= (x+2)(x+1)$
 $x = -2, -1$
 $(-1, 0), (-2, 0)$



#33 $y = \sqrt{x}$

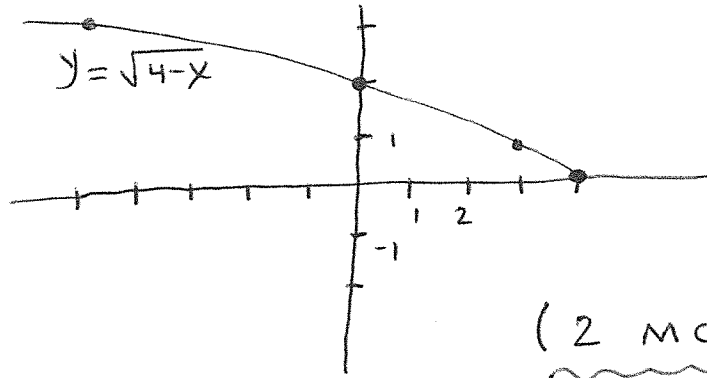
$y=0$ when $x=0$

x	y
0	0
1	1
4	2
9	3



#34 $y = \sqrt{4-x}$

x	y
4	0
3	1
0	2
-5	3



(2 marks)

#59 $f(x) = \begin{cases} 3-x & \text{for } x < 1 \\ x^2+1 & \text{for } x \geq 1 \end{cases}$

One part of the graph is a quadratic, the other a line

QUAD: $y = x^2 + 1$

vertex: $x=0$ $y=1$ $(0,1)$

y-intercept $(0,1)$

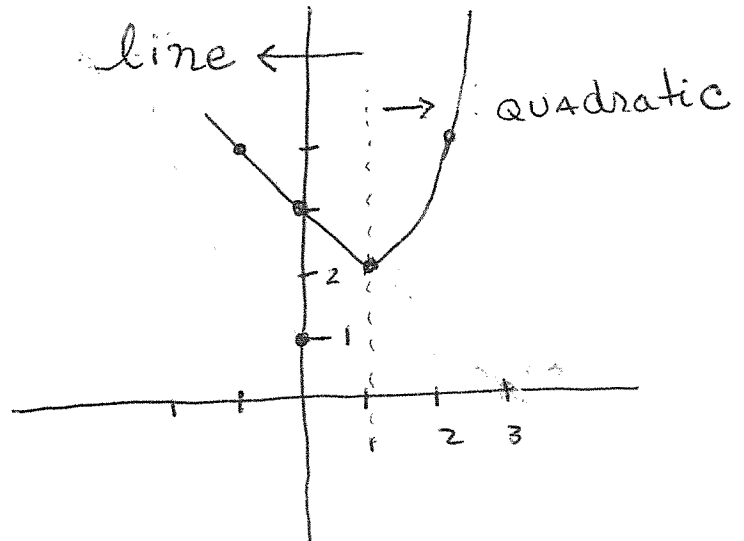
x-intercepts $0 = x^2 + 1$

$x^2 = -1$
impossible
no x-intercepts

Other points

$x=1$ $y=2$

$x=-1$ $y=2$

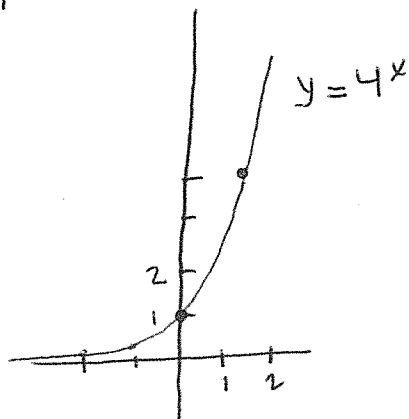


(4 marks)

Section 13.1

#13 $y = 4^x$

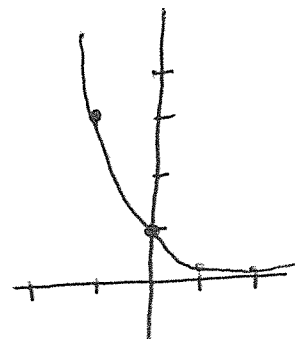
x	y
-2	1/16
-1	1/4
0	1
1	4
2	16



#14

$y = 0.25^x$
 $= (\frac{1}{4})^x = 4^{-x}$

x	y
-2	16
-1	4
0	1
1	1/4
2	1/16



(3 marks)

Section 13.2

#6 $5^2 = 25 \rightarrow \log_5 25 = 2$

#8 $2^7 = 128 \rightarrow \log_2 128 = 7$

#10 $3^{-2} = \frac{1}{9} \rightarrow \log_3 \frac{1}{9} = -2$ (3 marks)

#20 $\log_{15} 1 = 0 \rightarrow 15^0 = 1$

#24 $\log_{32} (\frac{1}{8}) = -0.6 \rightarrow 32^{-0.6} = \frac{1}{8}$

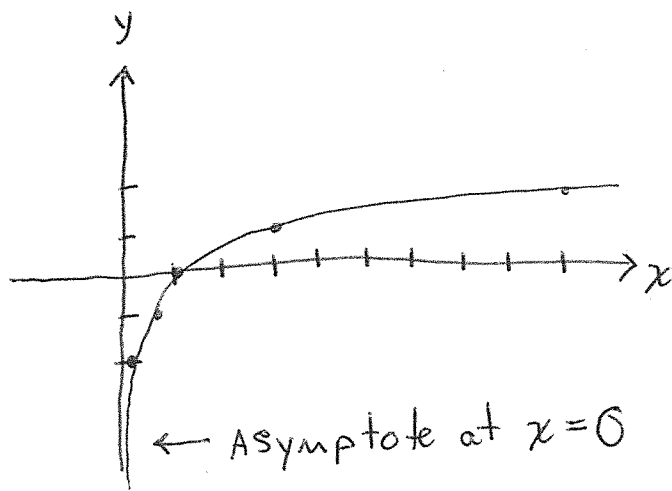
#28 $\log_{1/3} 3 = -1 \rightarrow (\frac{1}{3})^{-1} = 3$ (3 marks)

#45 $y = \log_3 x$

exponential form

$3^y = x$

y	x
-2	1/9
-1	1/3
0	1
1	3
2	9

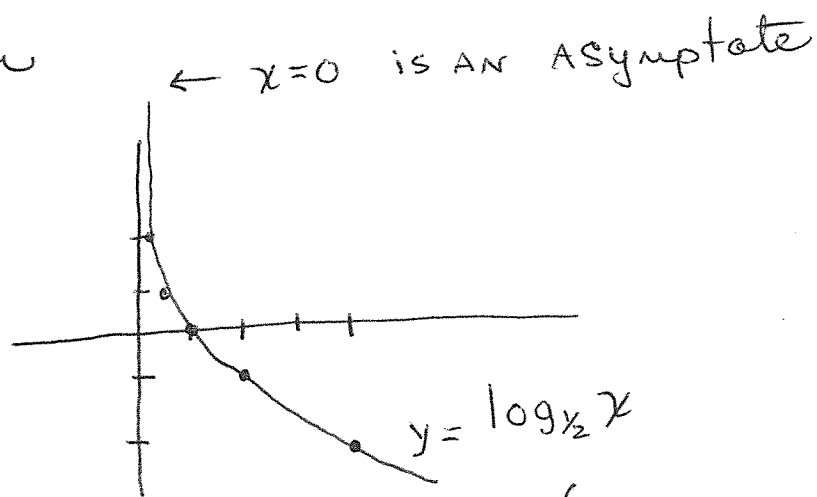


#47 $y = \log_{\frac{1}{2}} x$

exponential form

$$\left(\frac{1}{2}\right)^y = x$$

y	x
-2	4
-1	2
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$

(3 marks)CHAPTER 13 Review

#2 $\log_9 x = 3$

$$x = 9^3 = 729 \quad (1 \text{ mark})$$

#6 $\log_{12} 144 = x - 3$

$$2 = x - 3 \quad (1 \text{ mark})$$

$$x = 5$$

#26 $2 \ln y = \ln e^2 - 3 \ln x$

$$\ln y^2 = \ln \left(\frac{e^2}{x^3} \right)$$

$$y^2 = \frac{e^2}{x^3}$$

$$y = \pm \sqrt{\frac{e^2}{x^3}}$$

#28 $2 (\log_9 y + 2 \log_9 x) = 1$

$$\log_9 (yx^2) = \frac{1}{2}$$

$$yx^2 = 9^{1/2}$$

$$y = \frac{3}{x^2}$$

(2 marks)

$$\# 32 \quad \log_7 y = 2 \log_7 5 + \log_7 x + 2$$

$$\log_7 y = \log_7 25 + \log_7 x + \log_7 49$$

$$\log_7 y = \log_7 (25 \cdot x \cdot 49)$$

$$y = 1225x$$

(2 marks)

$$\# 34 \quad \frac{\log_7 x}{\log_7 4} - \log_7 y = 1$$

$$\left(\frac{1}{\log_7 4}\right) \log_7 x - 1 = \log_7 y$$

$$\log_7 x^{\frac{1}{\log_7 4}} - \log_7 7 = \log_7 y$$

$$\log_7 \left(\frac{x^{\frac{1}{\log_7 4}}}{7}\right) = \log_7 y$$

$$y = \frac{x^{\frac{1}{\log_7 4}}}{7}$$

$$\# 35 \quad 2^y = e^x$$

$$\ln 2^y = \ln e^x$$

$$y \ln 2 = x$$

$$y = \frac{x}{\ln 2}$$

(1 mark)

$$\# 36 \quad 10^y = 3^{x+1}$$

$$\log 10^y = \log 3^{x+1}$$

$$y = (x+1) \log 3$$

(1 mark)

$$\#54 \quad 2(5^x) = 15$$

$$5^x = 15/2$$

$$\log_5 5^x = \log_5 (15/2)$$

$$x = \log_5 (15/2)$$

$$= \frac{\log(15/2)}{\log 5}$$

$$= 1.2519$$

(2 marks)

55

$$3^{x+2} = 5^x$$

$$\log 3^{x+2} = \log 5^x$$

$$(x+2) \log 3 = x \log 5$$

$$x \log 3 + 2 \log 3 = x \log 5$$

$$x \log 3 - x \log 5 = -2 \log 3$$

$$x (\log 3 - \log 5) = -2 \log 3$$

$$x = \frac{-2 \log 3}{\log 3 - \log 5} = 4.301$$

60

$$\log(n+2) + \log n = 0.4771$$

$$\log[(n+2)n] = 0.4771$$

$$n^2 + 2n = 10^{0.4771}$$

$$n^2 + 2n - 3 = 0$$

$$(n+3)(n-1) = 0$$

$$n = -3, 1$$

but $n = -3$ is not
a solⁿ $n = 1$

(3 marks)