① graph

$$f(x) = \begin{cases} x+4 & \text{if } x < 1 \\ -1 & \text{if } x \geq 1 \end{cases}$$

M131 4 TEST 2 Step

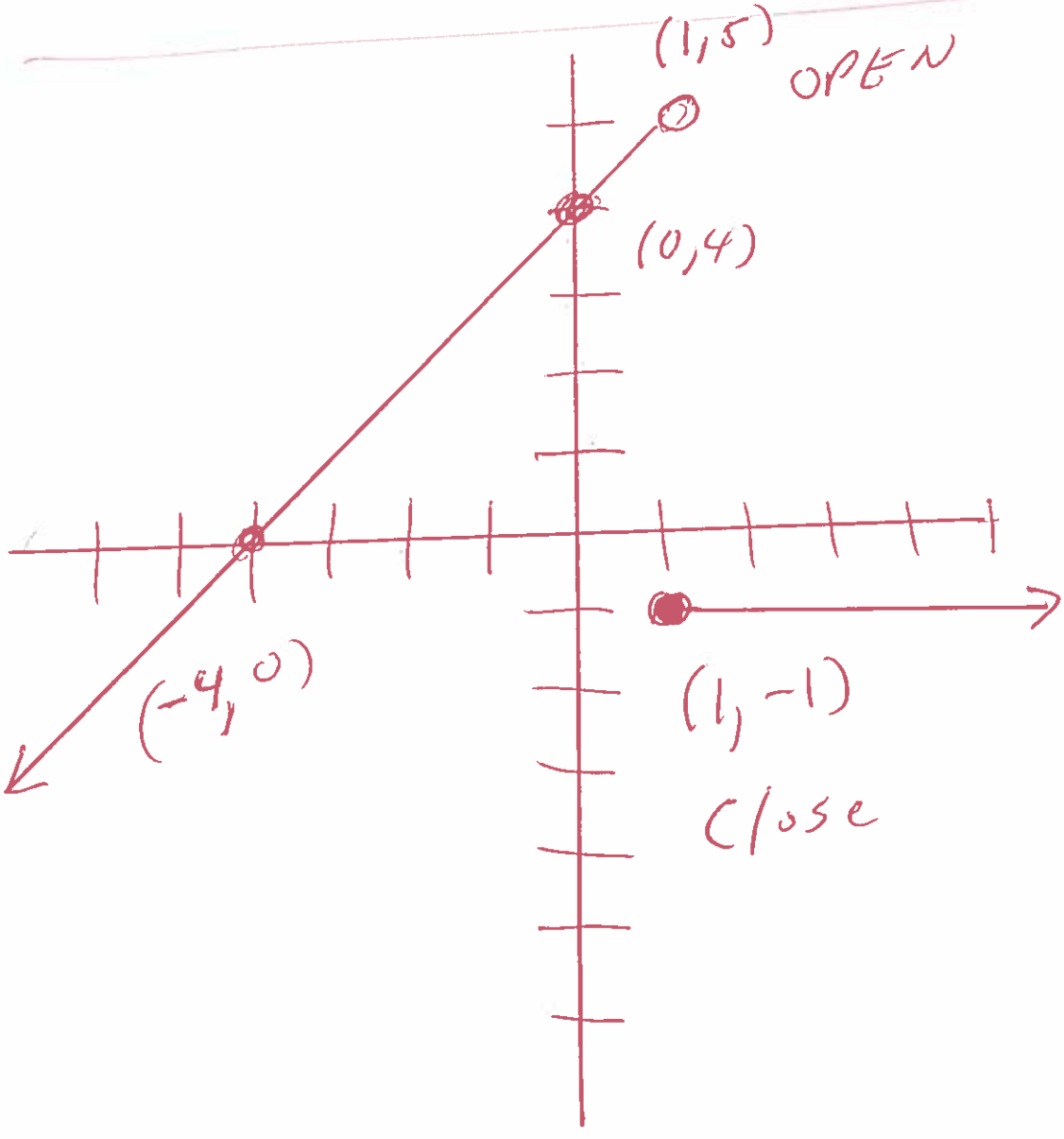
05/2017

use graphing calculator

2ND MATH

$y_1 = x+4 \div_0 (x<1)$ OPEN

$y_2 = -1 \div_0 (x \geq 1)$ Close



② $f(x) = x^2 + 6x + 4$

$$\frac{f(x+h) - f(x)}{h} =$$

$$\frac{((x+h)^2 + 6(x+h) + 4) - (x^2 + 6x + 4)}{h} =$$

$$\frac{(x+h)(x+h) + 6x + 6h + 4 - x^2 - 6x - 4}{h} =$$

$$\frac{x^2 + xh + xh + h^2 + 6x + 6h + 4 - x^2 - 6x - 4}{h} =$$

$$\frac{1xh + 1xh + h^2 + 6h}{h} =$$

$$\frac{2xh + h^2 + 6h}{h} =$$

$$2x + h + 6 =$$

3. Find domain

$f(x) = \sqrt{19 - x}$

Let $19 - x \geq 0$

$19 - x - 19 \geq 0 - 19$

$-x \geq -19$

$\frac{-x}{-1} \leq \frac{-19}{-1}$

$x \leq 19$

19

$(-\infty, 19]$

formula domain 3

$f(x) = \sqrt{Ax + B}$

Let $Ax + B \geq 0$

4 graph

$x^2+y^2-6x-12y+29=0$

$x^2-6x+y^2-12y=-29$

$x^2-6x+\left(\frac{1}{2}(-6)\right)^2+y^2-12y+\left(\frac{1}{2}(-12)\right)^2=-29+\left(\frac{1}{2}(-6)\right)^2+\left(\frac{1}{2}(-12)\right)^2$

$x^2-6x+(-3)^2+y^2-12y+(-6)^2=-29+(-3)^2+(-6)^2$

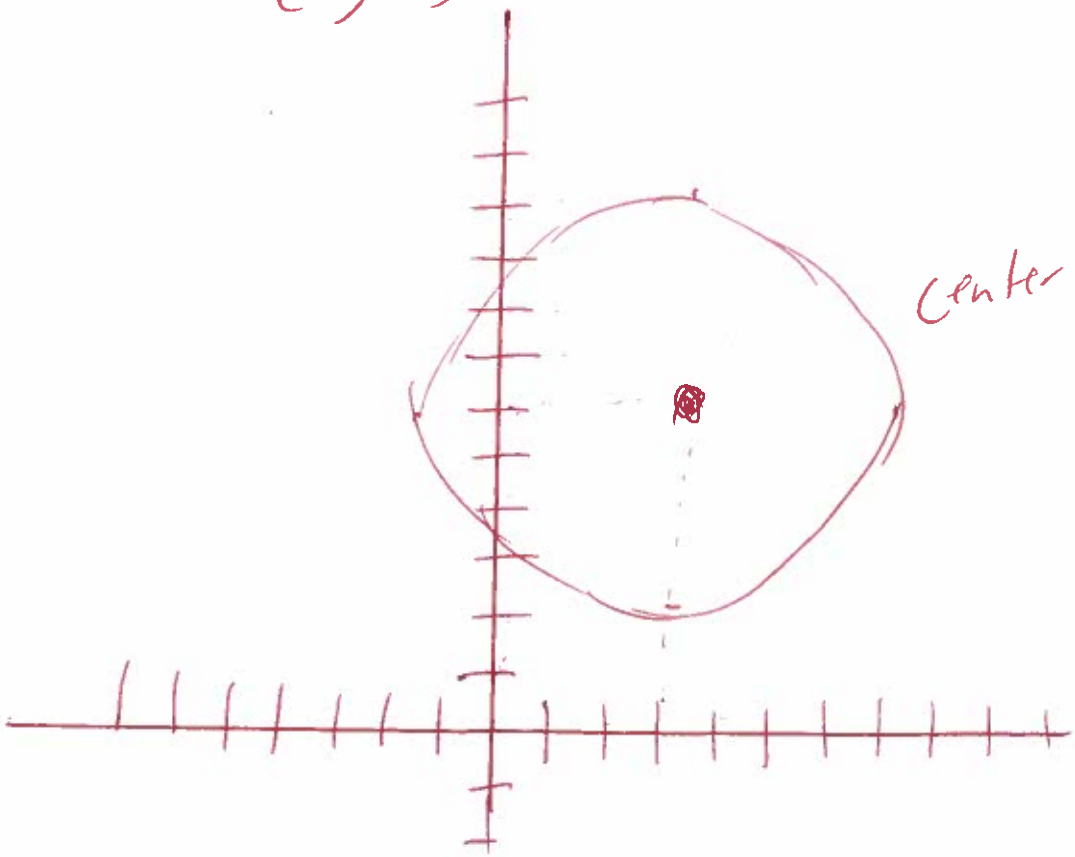
$x^2-6x+9+y^2-12y+36=-29+9+36$

$(x-3)(x-3)+(y-6)(y-6)=16$

$(x-3)^2+(y-6)^2=16$

ODD ODD

Center $=(3,6)$ Radius $=\sqrt{16}=4$

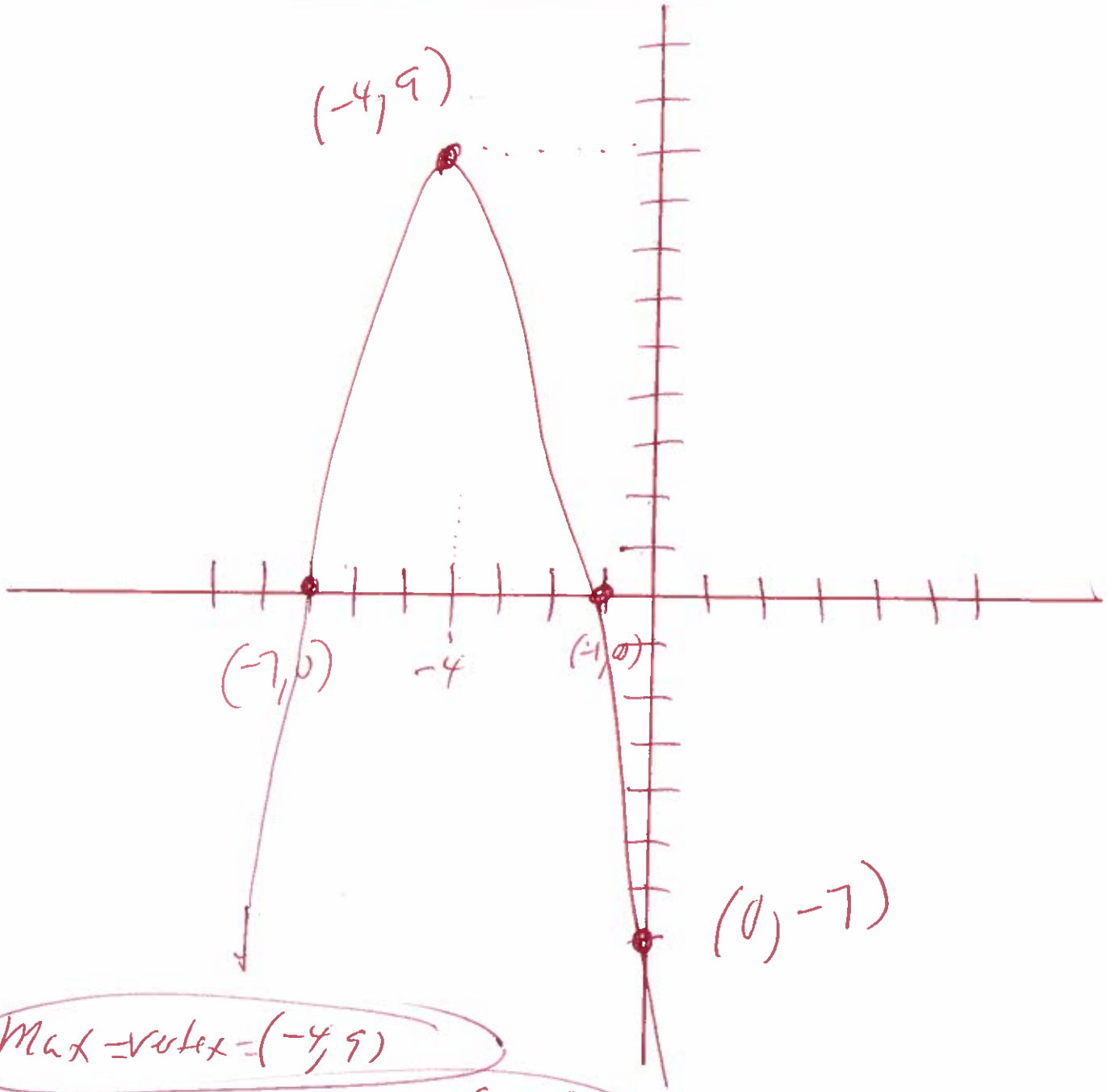


(5) Graph

$f(x) = -x^2 - 8x - 7$

use graphing calculator

$Y_1 = -x\hat{}2 \text{ —— } 8x \text{ —— } 7$



Max = vertex = (-4, 9)

x intrupt (-7, 0) (-1, 0)

y int (0, -7)

axis x = -4

6. Find Max

$h(x) = -16x^2 + 64x$

$a = -16, \quad b = 64, \quad c = 0$

$\text{Max} = \text{Vertex} = \left(\frac{-b}{2a}, \; f\left(\frac{-b}{2a}\right)\right)$

$\text{Vertex} = \left(\frac{-(64)}{2(-16)}, \; f\left(\frac{-(64)}{2(-16)}\right)\right)$

$\text{Vertex} = \left(\frac{-64}{-32}, \; f\left(\frac{-64}{-32}\right)\right)$

$\text{Vertex} = (2, \; f(2))$

$\text{Vertex} = (2, \; -16(2)^2 + 64(2))$

$\text{Vertex} = (2, \; -16(2)(2) + 64(2))$

$\text{Vertex} = (2, \; -16(4) + 64(2))$

$\text{Vertex} = (2, \; -64 + 128)$

$\text{Vertex} = (2, 64)$

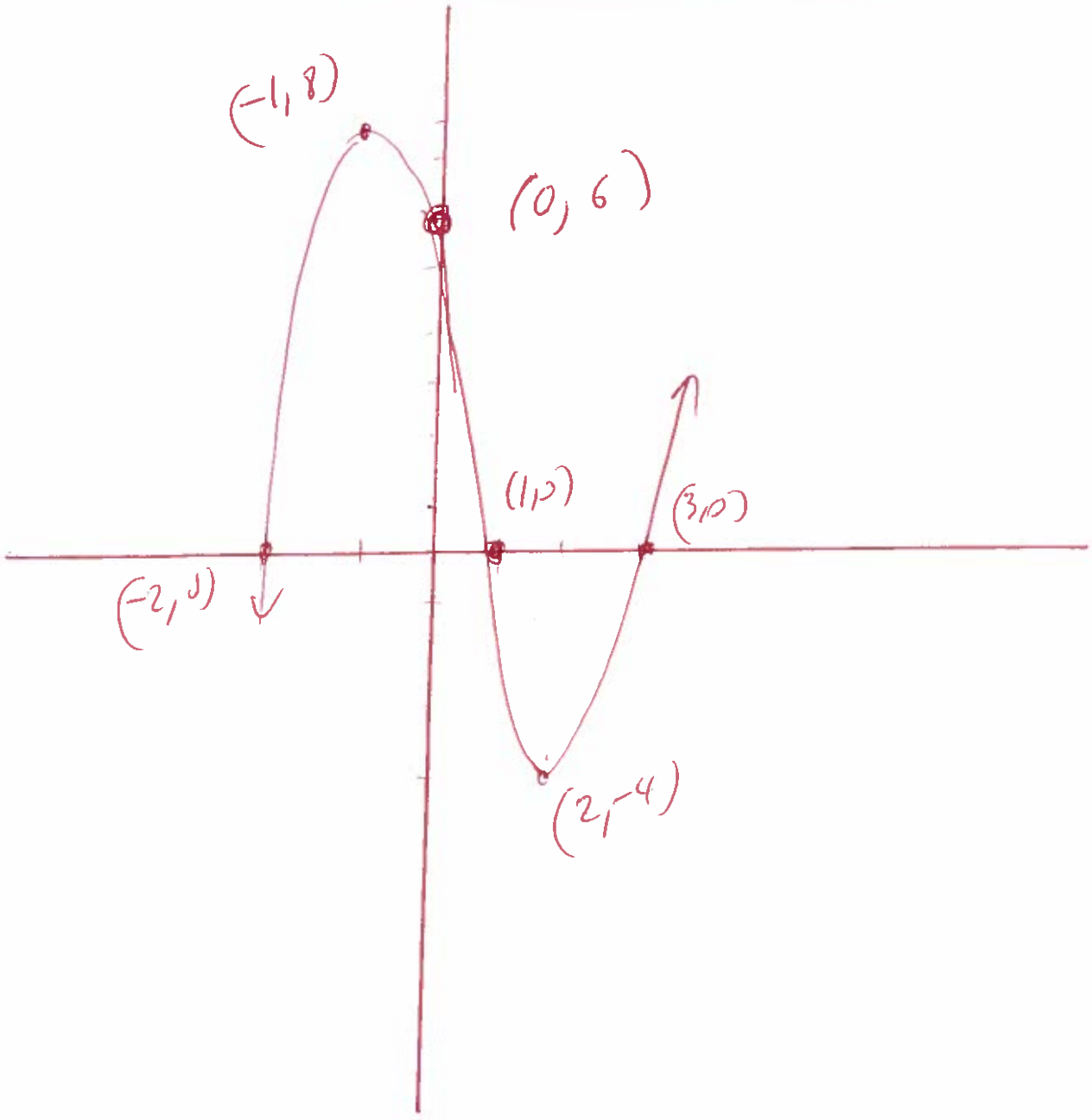
$\text{Max} = 64$

7. graph

$f(x) = x^3 - 2x^2 - 5x + 6$

use a graphing calculator

$Y_1 = X\wedge 3 \text{ —— } 2X\wedge 2 \text{ —— } 5X + 6$



8. $x^3 - 3x^2 - 10x + 24 = 0$

$x = 2$ (4)

$\pm 24; \pm 12, \pm 8, \pm 6, \pm 4, \pm 2, \pm 1$ possible

Use synthetic division

2) $1 \quad -3 \quad -10 \quad 24$

$\quad\quad 2 \quad -2 \quad -24$

$1 \quad -1 \quad -12 \quad 0$ rem

$x^2 - x - 12 = 0$

$(x+3)(x-4) = 0$

$x+3=0$ OR $x-4=0$

$x+3-3=0-3$ OR $x-4+4=0+4$

$x = -3$ OR $x = 4$

$\{2, -3, 4\}$

9) $f(x) = x^3 - 7x^2 + 19x - 13 = 0$

$\pm 13, \pm 1$ possible ①

1)

1	−7	19	−13
	1	−6	13
1	−6	13	0 rem

use Synthetic division

$1x^2 - 6x + 13 = 0$

$a = 1, \quad b = -6, \quad c = 13$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(13)}}{2(1)}$$

$$x = \frac{6 \pm \sqrt{36 - 52}}{2}$$

$$x = \frac{6 \pm \sqrt{-16}}{2}$$

$$x = \frac{6 \pm 4i}{2}$$

$$x = 3 \pm 2i$$

$x = 3 + 2i$ or $x = 3 - 2i$

$\{1, 3+2i, 3-2i\}$

(10) Find vertical asymptotes

(10)

$$\frac{x-36}{x^2-11x+24}$$

set $x^2-11x+24=0$

$(x-3)(x-8)=0$

$x-3=0$ or $x-8=0$

$x-3+3=0+3$ or $x-8+8=0+8$

$x=3$ or $x=8$

vertical asymptote

11. Find horizontal asymptote

$$g(x) = \frac{5x^2 - 8x - 7}{9x^2 + 3x + 3}$$

11

$$y = HA = \frac{5x^2}{9x^2}$$

$$y = \frac{5}{9}$$

horizontal asymptote

(12) Find slant asymptote

$$f(x) = \frac{x^2+2x-2}{x-8}$$

(12)

Use synthetic division

$$\begin{array}{r|rrr} 8 & 1 & 2 & -2 \\ & & 8 & 80 \\ \hline & 1 & 10 & (78) \end{array}$$ rem

$y = x + 10$

Use a graphing Calculator

13. $f(x) = 180e^{0.051x}$

$f(4) = 180e^{(0.051(4))}$ 2ND LN

$f(4) = 180e^{(.204)}$

$f(4) = 180(1.226298153)$

$f(4) = 220.7336676$

OR

Round

$f(4) = 221$

14

$D(h) = 6e^{-0.4h}$

$D(8) = 6e^{(-0.4(8))}$

$D(8) = 6e^{(-3.2)}$

$D(8) = 6(.040762204)$

$D(8) = 0.244573223 9$

OR

Round

$D(8) = 0.24$

use a graphing Calculator

2ND LN

(15) Find domain

$f(x) = \ln(2-x)$

$2-x > 0$

$2-x-2 > 0-2$

$-x > -2$

$\frac{-x}{-1} < \frac{-2}{-1}$

$x < 2$

2

$(-\infty, 2)$

formula domain (15)

$f(x) = \log(Ax+B)$

$Ax+B > 0$

16. Expand

$$\log_a\left(\frac{x^4\sqrt[3]{x+5}}{(x-2)^2}\right)$$

$$\log_a\left(x^4\sqrt[3]{x+5}\right) - \log_a (x-2)^2 =$$

$$\left(\log_a(x^4) + \log_a \sqrt[3]{x+5}\right) - \left(\log_a (x-2)^2\right) =$$

$$\left(\log_a(x^4) + \log_a (x+5)^{1/3}\right) - \left(\log_a (x-2)^2\right) =$$

$$\log_a(x^4) + \log_a (x+5)^{1/3} - \log_a (x-2)^2 =$$

$$4\log_a(x) + \frac{1}{3}\log_a(x+5) - 2\log_a(x-2) =$$

formulas

$$\ln(A) + \ln(B) = \ln(AB)$$

$$\ln(A) - \ln(B) = \ln\left(\frac{A}{B}\right)$$

$$\ln(A^N) = N\ln(A)$$

$$\ln(e) = 1$$

(17) $25^{x+7} = 125^{x-2}$

(17)

$(5^{-2})^{x+7} = (5^{-3})^{x-2}$

$5^{2x+14} = 5^{3x-6}$

$2x+14 = 3x-6$

$2x+14-14 = 3x-6-14$

$2x = 3x-20$

$2x-3x = 3x-20 \quad -3x$

$-1x = -20$

$\frac{-1x}{-1} = \frac{-20}{-1}$

$x = 20$

18. $3^{x+6} = 8$

(18)

$\ln(3^{x+6}) = \ln(8)$

$(x+6)\ln(3) = \ln(8)$

$\frac{(x+6)\ln(3)}{\ln(3)} = \frac{\ln(8)}{\ln(3)}$

$x+6 = \frac{\ln(8)}{\ln(3)}$

$x+6-6 = \frac{\ln(8)}{\ln(3)} - 6$

$x = \frac{\ln(8)}{\ln(3)} - 6$

$x = -4.107210739$ Round

$x = -4.11$ OR

Formulas

$\ln(A) + \ln(B) = \ln(AB)$

$\ln(A) - \ln(B) = \ln(\frac{A}{B})$

$\ln(A^N) = N\ln(A)$

$\ln(e) = 1$

(19) $\log_4(x+4) + \log_4(x-2) = 2$

$\log_4(x+4)(x-2) = 2$

$4^2 = (x+4)(x-2)$

$16 = x^2 - 2x + 4x - 8$

$16 = x^2 + 2x - 8$

$0 = x^2 + 2x - 8 - 16$

$0 = x^2 + 2x - 24$

$0 = (x-4)(x+6)$

let $x-4=0$ OR $x+6=0$

$x-4+4=0+4$ OR $x+6-6=0-6$

$x=4$ OR $x=-6$

ck Good BAD

$\log_4(4+4) + \log_4(4-2) = 2$

$\log_4(8) + \log_4(2) = 2$

Good Good

$\log_4(-6+4) + \log_4(-6-2) = 2$

$\log_4(-2) + \log_4(-8) = 2$.

BAD BAD

(19)

formulas

$\ln(A) + \ln(B) = \ln(AB)$

$\ln(A) - \ln(B) = \ln\left(\frac{A}{B}\right)$

$\ln(A^N) = N\ln(A)$

$\ln(e) = 1$

$\{4\}$

(20) $\log(4+x) - \log(x-4) = \log(3)$

$\log\left(\frac{4+x}{x-4}\right) = \log(3)$

(20)

Formulas:
$\ln(A) + \ln(B) = \ln(AB)$
$\ln(A) - \ln(B) = \ln\left(\frac{A}{B}\right)$
$\ln(A^N) = N\ln(A)$
$\ln(e) = 1$

$\frac{4+x}{x-4} = 3$

$\frac{4+x}{x-4} = \frac{3}{1}$

$1(4+x) = 3(x-4)$ cross Mult

$4 + 1x = 3x - 12$

$4 + 1x - 4 = 3x - 12 - 4$

$1x = 3x - 16$

$1x - 3x = 3x - 16 - 3x$

$-2x = -16$

$\frac{-2x}{-2} = \frac{-16}{-2}$

$x = 8$

{8}

Ck $\log(4+8) - \log(8-4) = \log(3)$

$\log(12) - \log(4) = \log(3)$

Good Good Good

21. $\ln(x)+\ln(x-1)=\ln(12)$

$\ln(x)(x-1)=\ln(12)$

$x(x-1)=12$

$x^2-x=12$

$x^2-x-12=0$

$(x+3)(x-4)=0$

so $x+3=0$ or $x-4=0$

$x+3-3=0-3$ OR $x-4+4=0+4$

$x=-3$ BAD ~~BAD~~ or $x=4$ good

Ck

$\ln(-3)+\ln(-3-1)=\ln(12)$

$\ln(-3)+\ln(-4)=\ln(12)$

BAD BAD

Ck

$\ln(4)+\ln(4-1)=\ln(12)$

$\ln(4)+\ln(3)=\ln(12)$

good good good

{4}

(2)

Formulas

$\ln[A]+\ln(B)=\ln(AB)$

$\ln(A)-\ln(B)=\ln\left(\frac{A}{B}\right)$

$\ln A^N=N\ln(A)$

$\ln(e)=1$

22

$$6200 = 3100\left(1+\frac{.08}{2}\right)^{2x}$$

$$\frac{6200}{3100} = \frac{3100\left(1+\frac{.08}{2}\right)^{2x}}{3100}$$

$$2 = \left(1+\frac{.08}{2}\right)^{2x}$$

$$\ln(2) = \ln\left(1+\frac{.08}{2}\right)^{2x}$$

$$\ln(2) = 2x\ln\left(1+\frac{.08}{2}\right)$$

$$\frac{\ln(2)}{\ln\left(1+\frac{.08}{2}\right)} = \frac{2x\ln\left(1+\frac{.08}{2}\right)}{\ln\left(1+\frac{.08}{2}\right)}$$

$$\frac{\ln(2)}{\ln\left(1+\frac{.08}{2}\right)} = 2x$$

$$\frac{1}{2}\cdot\frac{\ln(2)}{\ln\left(1+\frac{.08}{2}\right)} = \frac{1}{2}(2x)$$

$$\frac{\ln(2)}{2\ln\left(1+\frac{.08}{2}\right)} = x$$

$8.836493893 = x$

$8.8 = x$ Round

22

Formulas

$\ln(A)+\ln(B)=\ln(AB)$

$\ln(A)-\ln(B)=\ln\left(\frac{A}{B}\right)$

$\ln(A^N)=N\ln(A)$

$\ln(e)=1$

23

$375 = 700e^{-0.00693x}$

$\frac{375}{700} = \frac{700e^{-0.00693x}}{700}$

$\frac{375}{700} = e^{-0.00693x}$

$\ln\left(\frac{375}{700}\right) = \ln\left(e^{-0.00693x}\right)$

$\ln\left(\frac{375}{700}\right) = -0.00693x \ln(e)$

$\ln\left(\frac{375}{700}\right) = -0.00693x(1)$

$\ln\left(\frac{375}{700}\right) = -0.00693x$

$\frac{\ln\left(\frac{375}{700}\right)}{-0.00693} = \frac{-0.00693x}{-0.00693}$

$90.065555681x = x$ Round

$90 = x$

23

formulas

$\ln(A) + \ln(B) = \ln(AB)$

$\ln(A) - \ln(B) = \ln\left(\frac{A}{B}\right)$

$\ln(e) = 1$

$\ln(A^N) = N\ln(A)$

24

$200 = 100e^{.026x}$

$\frac{200}{100} = \frac{100e^{.026x}}{100}$

$2 = e^{.026x}$

$\ln(2) = \ln(e^{.026x})$

$\ln(2) = .026x(\ln(e))$

$\ln(2) = .026x(1)$

$\ln(2) = .026x$

$\frac{\ln(2)}{.026} = \frac{.026x}{.026}$

$26.65950694 = x$ Round or

$27 = x$

24

Formulas

$\ln(A) + \ln(B) = \ln(AB)$

$\ln(A) - \ln(B) = \ln\left(\frac{A}{B}\right)$

$\ln(A^N) = N\ln(A)$

$\ln(e) = 1$

25.

$$9 = 100\left(\frac{1}{2}\right)^{\frac{t}{5600}}$$

$$\frac{9}{100} = \frac{100\left(\frac{1}{2}\right)^{\frac{t}{5600}}}{100}$$

$$.09 = \left(\frac{1}{2}\right)^{\frac{t}{5600}}$$

$$\ln(.09) = \ln\left(\frac{1}{2}\right)^{\frac{t}{5600}}$$

$$\ln(.09) = \frac{t}{5600}\ln\left(\frac{1}{2}\right)$$

$$\frac{\ln(.09)}{\ln\left(\frac{1}{2}\right)} = \frac{\frac{t}{5600}\ln\left(\frac{1}{2}\right)}{\ln\left(\frac{1}{2}\right)}$$

$$\frac{\ln(.09)}{\ln\left(\frac{1}{2}\right)} = \frac{t}{5600}$$

$$5600\frac{\ln(.09)}{\ln\left(\frac{1}{2}\right)} = 5600\left(\frac{t}{5600}\right)$$

$$\frac{5600\ln(.09)}{\ln\left(\frac{1}{2}\right)} = t$$

$$19454.01465 = t$$

OR $19454.$ Round

they rounded before dividing

OR answer on test

$$19419 = t$$