8.1
2.4
7.1
Math1314Break43Φtip
03-07-19
03-19-19

① $8x^2+10x-7=0$

$(2x-1)(4x+7)=0$

set $2x-1=0$ or $4x+7=0$

$2x-1+1=0+1$ or $4x+7-7=0-7$

$2x=1$ or $4x=-7$

$\frac{2x}{2}=\frac{1}{2}$ or $\frac{4x}{4}=\frac{-7}{4}$

$x=\frac{1}{2}$ or $x=\frac{-7}{4}$

Use Quad form

$8x^2+10x-7=0$

$a=8,\ b=10,\ c=-7$

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

$$x=\frac{-(10)\pm\sqrt{(10)^2-4(8)(-7)}}{2(8)}$$

$$x=\frac{-10\pm\sqrt{100+224}}{16}$$

$$x=\frac{-10\pm\sqrt{324}}{16}$$

$$x=\frac{-10\pm18}{16}$$

$x=\frac{-10+18}{16}$ or $x=\frac{-10-18}{16}$

$x=\frac{8}{16}$ or $x=\frac{-28}{16}$

$x=\frac{8(1)}{8(2)}$ or $x=\frac{\cancel{4}(-7)}{\cancel{4}(4)}$

$x=\frac{1}{2}$ or $x=\frac{-7}{4}$

(2) $5x^2 = 14x + 3$

$5x^2 - 14x - 3 = 0$ (5.1) (3.1)

$(5x+1)(x-3) = 0$

set $5x+1=0$ OR $x-3=0$

$5x+1-1=0-1$ OR $x-3+3=0+3$

$5x=-1$ OR $x=3$

$\frac{5x}{5} = \frac{-1}{5}$ OR

$x = -\frac{1}{5}$

use Quad form

$5x^2 - 14x - 3 = 0$

$a=5,\ b=-14,\ c=-3$

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

$x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(5)(-3)}}{2(5)}$

$x = \frac{14 \pm \sqrt{196+60}}{10}$

$x = \frac{14 \pm \sqrt{256}}{10}$

$x = \frac{14 \pm 16}{10}$

$x = \frac{14-16}{10}$ or $x = \frac{14+16}{10}$

$x = -\frac{2}{10}$ OR $x = \frac{30}{10}$

$x = \frac{\cancel{2}(-1)}{\cancel{2}(5)}$ OR $x = 3$

$x = -\frac{1}{5}$

3. $1x^2 - 2x + 5 = 0$

$a=1,\ b=-2,\ c=5$

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

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(5)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{4-20}}{2}$$

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

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

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

$$x = 1 \pm 2i$$

$x = 1+2i$ or $x = 1-2i$

④ $\sqrt{2x+13} = x+5$

$(\sqrt{2x+13})^2 = (x+5)^2$

$2x+13 = (x+5)(x+5)$

$2x+13 = x^2+5x+5x+25$

$2x+13 = x^2+10x+25$

$0 = x^2+10x+25-2x-13$

$0 = x^2+8x+12$

$0 = (x+2)(x+6)$

Possible

12, 1

6, 2

3, 4

Set $x+2=0$ OR $x+6=0$

$x+2-2=0-2$ OR $x+6-6=0-6$

$x=-2$ OR $\cancel{x=-6}$

answer

$\{-2\}$

Check

$\sqrt{2x+13} = x+5$

$\sqrt{2(-2)+13} = (-2)+5$

$\sqrt{-4+13} = -2+5$

$\sqrt{9} = 3$

$3 = 3$

Good

$\sqrt{2(-6)+13} = (-6)+5$

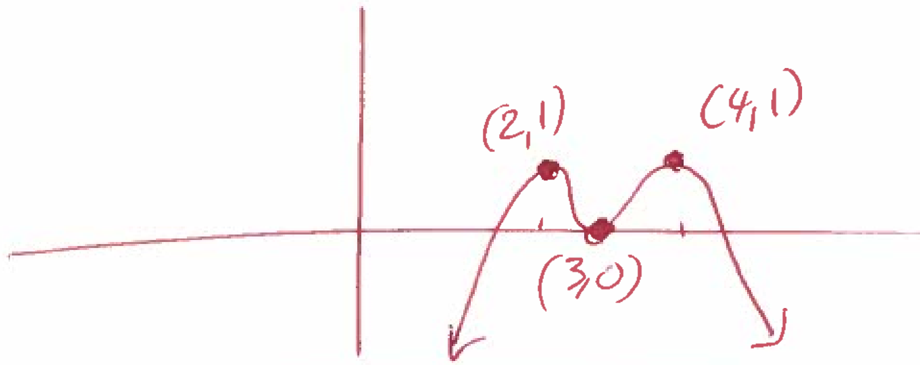
$\sqrt{-12+13} = -6+5$

$\sqrt{1} = -1$

$1 \neq -1$

BAD

5.



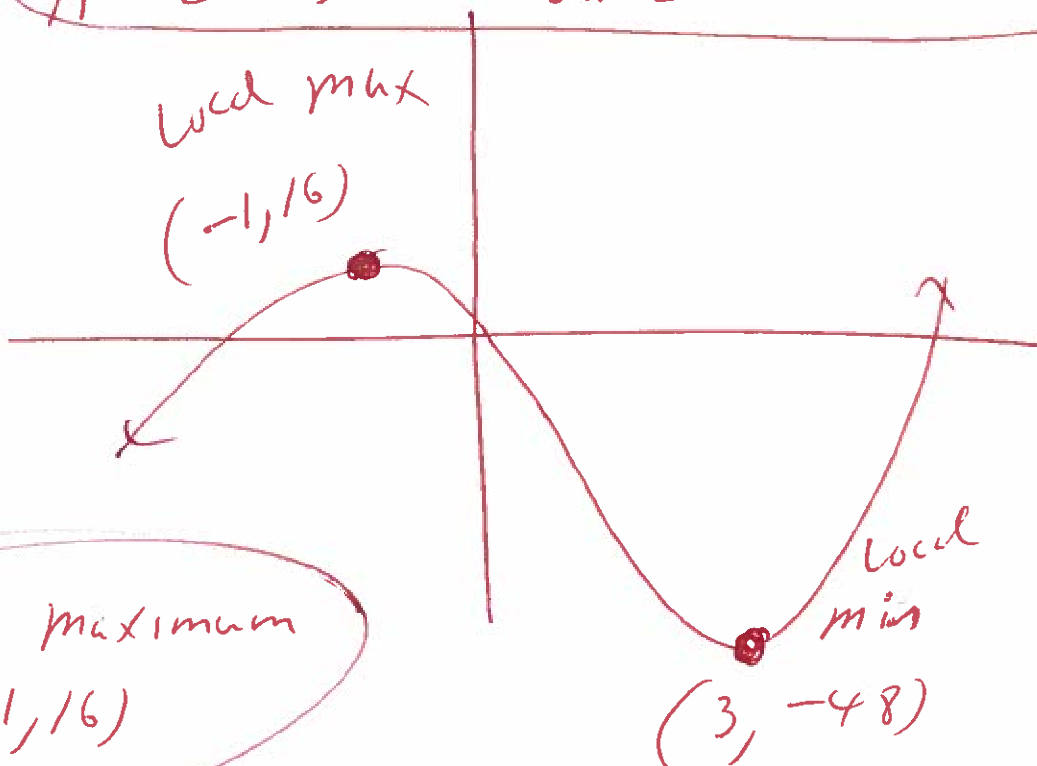
the function is increasing on the intervals
$(-\infty, 2)$, $(3, 4)$

the function is decreasing on the intervals
$(2, 3)$ $(4, \infty)$

(6) graph use graphing calculator

$f(x) = 2x^3 - 6x^2 - 18x + 6$

$y_1 = 2x\wedge 3$ BIG $-$ $6x\wedge 2$ BIG $-$ $18x + 6$



relative maximum at (-1,16)

relative minimum at (3,-48)

Set window

x-min = -5
xmax = 5
xscl = 1
ymin = -60
ymax = 60
yscl = 1

⑦ $f(x) = \begin{cases} x+2 & \text{if } x < -4 \\ x-2 & \text{if } x \geq -4 \end{cases}$

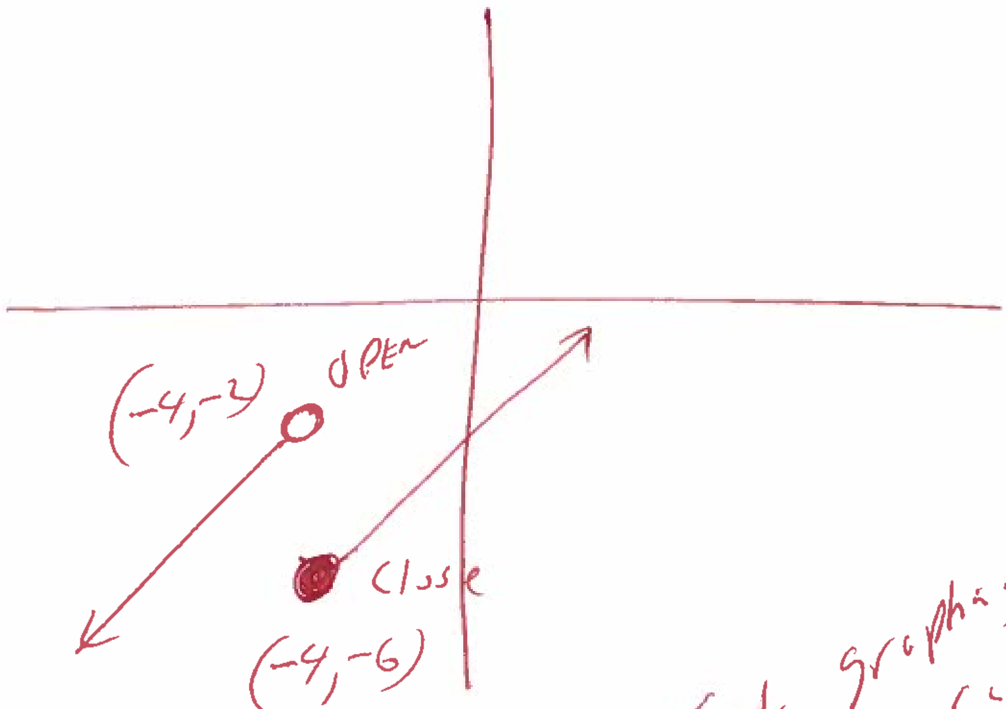
use graphing calculator

2ND math

$y_1 = x+2 \div (x < -4)$ OPEN enter

2ND math

$y_2 = x-2 \div (x \geq -4)$ Close enter



Set graphing calculator

Xmin = -12
Xmax = 12
Xscal = 1
ymin = -10
ymax = 10
yscl = 1

8. $f(x) = x^2 - 5x + 2$

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

$$\frac{((x+h)^2 - 5(x+h) + 2) - (x^2 - 5x + 2)}{h} =$$

$$\frac{(x+h)(x+h) - 5x - 5h + 2 - x^2 + 5x - 2}{h} =$$

$$\frac{x^2 + xh + xh + h^2 - 5x - 5h + 2 - x^2 + 5x - 2}{h} =$$

$$\frac{\cancel{x^2} + 2xh + h^2 \cancel{- 5x} - 5h \cancel{+ 2} \cancel{- x^2} \cancel{+ 5x} \cancel{- 2}}{h} =$$

$$\frac{2xh + h^2 - 5h}{h} =$$

$$\frac{2x\cancel{h}}{\cancel{h}} + \frac{h^2}{h} - \frac{5h}{h} =$$

$$2x + h - 5 =$$

9. use the graph $y = f(x)$ to graph the function $g(x) = f(x+1) + 4$

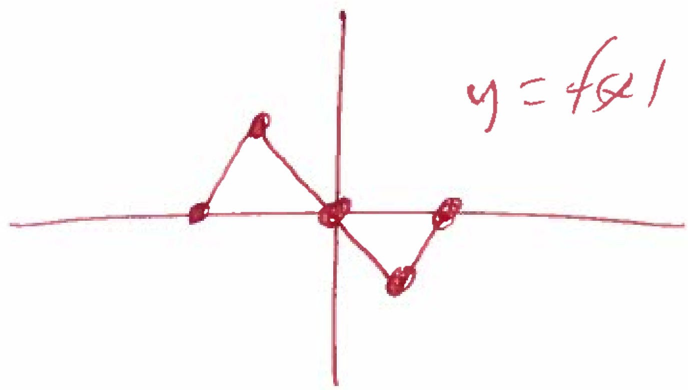
$$g(x) = f(x+1) + 4$$

left -1

up 4

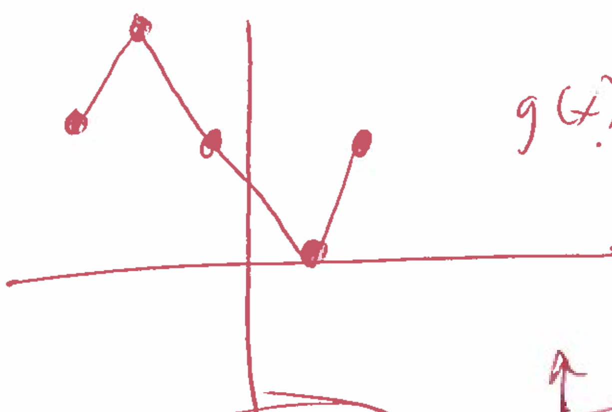
OLD

$y = f(x)$



NEW

$g(x) = f(x+1) + 4$



left -1

up 4

10. Find the domain

$f(x) = \sqrt{30-3x}$

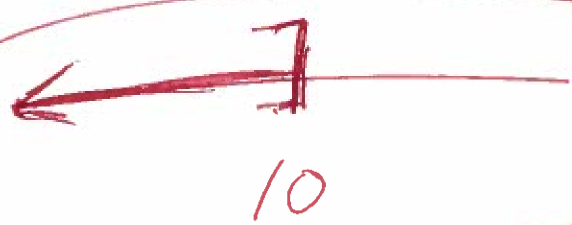
set $30-3x \geq 0$

$\cancel{30} - 3x - \cancel{30} \geq 0 - 30$

$-3x \geq -30$

$\frac{-3x}{-3} \leq \frac{-30}{-3}$

$x \leq 10$



$(-\infty, 10]$

Formula

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

set $Ax+B \geq 0$

(11.) $f(x)=3x^2-32x+64$, $g(x)=x-8$

$(f+g)(x)=$

$f(x)+g(x)=$

$(3x^2-32x+64)+(x-8)=$

$3x^2-32x+64+x-8=$

$3x^2-31x+56=$ domain $(-\infty,\infty)$

$(f-g)(x)=$

$f(x)-g(x)=$

$(3x^2-32x+64)-(x-8)=$

$3x^2-32x+64-x+8=$

$3x^2-33x+72=$ domain $(-\infty,\infty)$

$(f\cdot g)(x)=$

$f(x)\cdot g(x)=$

$(3x^2-32x+64)(x-8)=$

$3x^3-24x^2-32x^2+256x+64x-512=$

$3x^3-56x^2+320x-512=$ domain $(-\infty,\infty)$

$\left(\frac{f}{g}\right)(x)=$

$\frac{f(x)}{g(x)}=$

$\frac{3x^2-32x+64}{x-8}=$

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

$3x-8=$ domain

8

$(-\infty,8)\cup(8,\infty)$

(12) $f(x) = 1 - x$ and $g(x) = 4x^2 + x + 2$

$(f \circ g)(x) =$

$f(g(x)) =$

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

$1 - (4x^2 + x + 2) =$

$1 - 4x^2 - x - 2 =$

$-4x^2 - x - 1$

$(f \circ g)(x) = -4x^2 - x - 1$

$(f \circ g)(2) = -4(2)^2 - (2) - 1$

$= -4(2)(2) - (2) - 1$

$= -4(4) - (2) - 1$

$= -16 - 2 - 1$

$(f \circ g)(2) = -19$

$(g \circ f)(x) =$

$g(f(x)) =$

$g(1 - x) =$

$4(1-x)^2 + (1-x) + 2 =$

$4(1-x)(1-x) + (1-x) + 2 =$

$4(1 - 1x - 1x + x^2) + (1-x) + 2 =$

$4(1 - 2x + x^2) + (1-x) + 2 =$

$4 - 8x + 4x^2 + 1 - x + 2 =$

$4x^2 - 9x + 7$

$(g \circ f)(x) = 4x^2 - 9x + 7$

$(g \circ f)(2) = 4(2)^2 - 9(2) + 7$

$= 4(2)(2) - 9(2) + 7$

$= 4(4) - 9(2) + 7$

$= 16 - 18 + 7$

$= -2 + 7$

$= 5$

$(g \circ f)(2) = 5$

(13) Find the distance between the points $(4, 2)$ and $(10, 10)$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$d = \sqrt{((4) - (10))^2 + ((2) - (10))^2}$$

$$d = \sqrt{(4 - 10)^2 + (2 - 10)^2}$$

$$d = \sqrt{(-6)^2 + (-8)^2}$$

$$d = \sqrt{36 + 64}$$

$$d = \sqrt{100}$$

$$d = 10$$

(14) Find the midpoint of the line segment with the endpoints

$(8, 6)$ and $(4, 10)$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

$$\text{midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\text{midpoint} = \left(\frac{(8) + (4)}{2}, \frac{(6) + (10)}{2} \right)$$

$$\text{midpoint} = \left(\frac{8+4}{2}, \frac{6+10}{2} \right)$$

$$\text{midpoint} = \left(\frac{12}{2}, \frac{16}{2} \right)$$

$$\text{midpoint} = (6, 8)$$

(15.) $x^2 + y^2 + 4x + 2y - 4 = 0$

$x^2 + 4x + y^2 + 2y = 4$ rewrite

$x^2 + 4x + (\frac{1}{2}(4))^2 + y^2 + 2y + (\frac{1}{2}(2))^2 = 4 + (\frac{1}{2}(4))^2 + (\frac{1}{2}(2))^2$

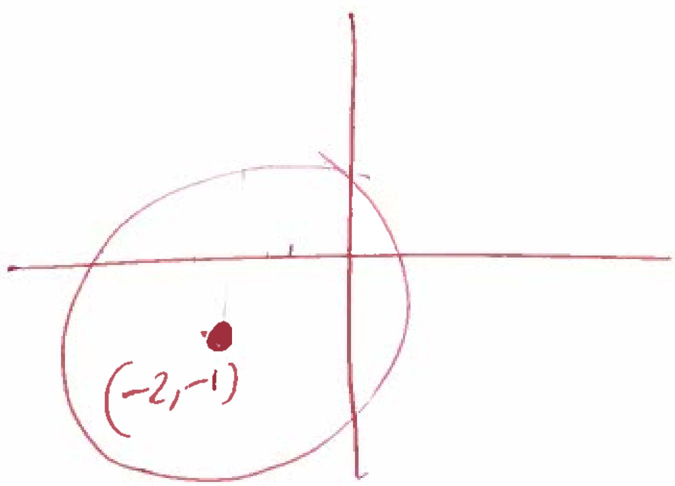
$x^2 + 4x + (2)^2 + y^2 + 2y + (1)^2 = 4 + (2)^2 + (1)^2$

$\underbrace{x^2 + 4x + 4} + y^2 + 2y + 1 = 4 + 4 + 1$

$(x+2)(x+2) + (y+1)(y+1) = 9$

$(x \underset{\text{OPP}}{+2})^2 + (y \underset{\text{OPP}}{+1})^2 = 9$

CENTER $= (-2, -1)$ Radius $= \sqrt{9} = 3$



(16) find Vertex

$f(x) = 4x^2 + 8x + 8$

$a = 4, \quad b = 8, \quad c = 8$

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

$\text{Vertex} = \left(-\frac{(8)}{2(4)},\ f\left(-\frac{(8)}{2(4)}\right)\right)$

$\text{Vertex} = \left(-\frac{8}{8},\ f\left(-\frac{8}{8}\right)\right)$

$\text{Vertex} = (-1,\ f(-1))$

$\text{Vertex} = (-1,\ 4(-1)^2 + 8(-1) + 8)$

$\text{Vertex} = (-1,\ 4(-1)(-1) + 8(-1) + 8)$

$\text{Vertex} = (-1,\ 4(1) + 8(-1) + 8)$

$\text{Vertex} = (-1,\ 4 - \cancel{8} + \cancel{8})$

$= (-1,\ 4)$

17. graph

$f(x) = (x-2)^2 - 1$

use graphing calculator

$y_1 = (x - 2)^\wedge 2 - 1$

Set graphing calculator

Xmin = -12

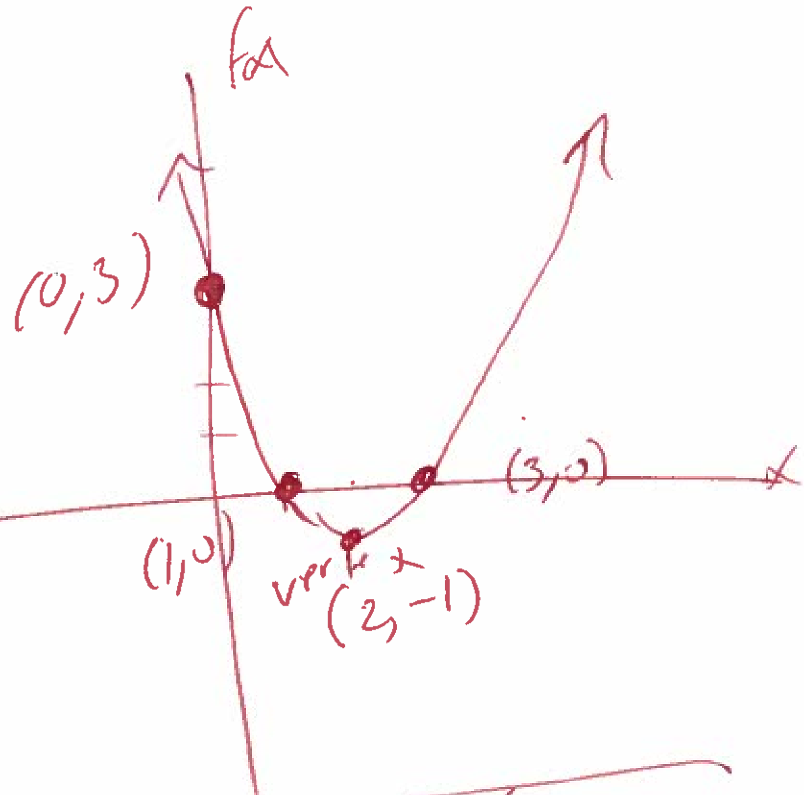
Xmax = 12

Xscl = 1

Ymin = -10

Ymax = 10

Yscl = 1



$x = 2$ axis of symmetry

vertex = $(2,-1)$

domain $(-\infty, \infty)$

range $[-1, \infty)$

18.

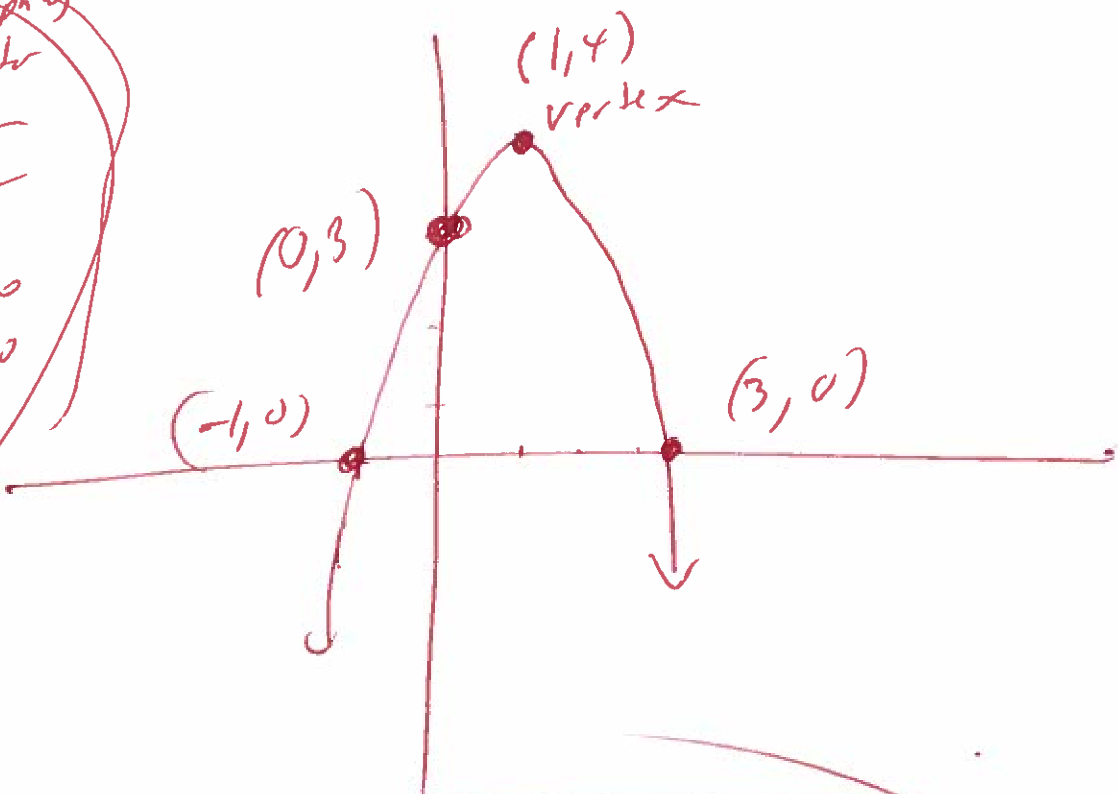
graph

use graphing calculator

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

$y_1 = 2x - x$^$2 + 3$

set graphing calculator
xmin = -12
xmax = 12
xscl = 1
ymin = -10
ymax = 10
yscl = 1



$x = 1$ axis of symmetry

vertex = (1, 4)

domain $(-\infty, \infty)$

range $(-\infty, 4]$

(19.) Solve $1x^3+2x^2-5x-6=0$

given $x=2$ is a zero

yes

$$\begin{array}{r|rrrr} 2 & 1 & 2 & -5 & -6 \\ & & 2 & 8 & 6 \\ \hline & 1 & 4 & 3 & 0 \end{array}$$ rem

$x^2+4x+3=0$

$(x+1)(x+3)=0$

set $x+1=0$ or $x+3=0$

$x+1-1=0-1$ or $x+3-3=0-3$

$x=-1$ or $x=-3$

$$\boxed{x=2,\quad x=-1,\quad x=-3}$$

28

$3x^3 - 7x^2 - 75x + 175 = 0$

$\frac{\text{Last}}{\text{First}} = \frac{\pm 175}{3}$

Possible

$\pm 1, \pm 5, \pm 25, \pm 7, \pm 35, \pm 175, \pm \frac{1}{3}, \pm \frac{5}{3}, \pm \frac{25}{3}, \pm \frac{7}{3}, \pm \frac{35}{3}, \pm \frac{175}{3}$

use synthetic division

yes

$$\begin{array}{r|rrrr} -5 & 3 & -7 & -75 & 175 \\ & & -15 & 110 & -175 \\ \hline & 3 & -22 & 35 & 0 \end{array}$$

rem

$3x^2 - 22x + 35 = 0$

$3 \cdot 1$ $35 \cdot 1$ $7 \cdot 5$

$(3x - 7)(x - 5) = 0$

Let $3x - 7 = 0$ or $x - 5 = 0$

$3x - \cancel{7} + \cancel{7} = 0 + 7$ OR $x - \cancel{5} + \cancel{5} = 0 + 5$

$3x = 7$ or $x = 5$

$\frac{3x}{3} = \frac{7}{3}$

$x = 7/3$

$$\boxed{x = -5, \quad x = \frac{7}{3}, \quad x = 5}$$

use graphing calculator

21) $f(x) = -x^3 + 3x^2 + 13x - 15$

little BIG

$y_1 = -x^3 + 3x^2 + 13x - 15$

Set graphing calculator

Xmin = −10

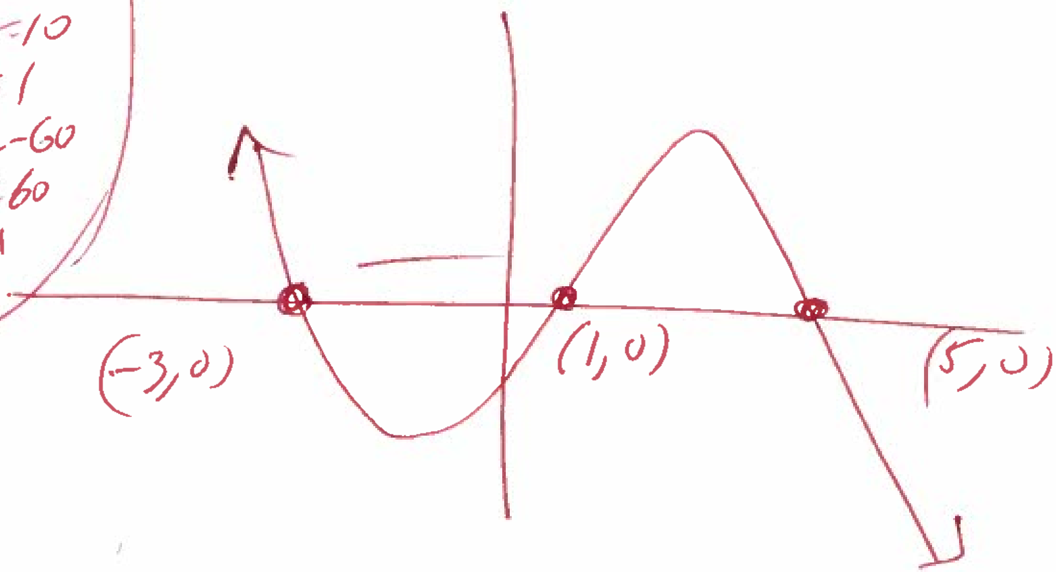
Xmax = 10

Xscl = 1

ymin = −60

ymax = 60

yscl = 1



Zeros are

$x = -3, \quad x = 1, \quad x = 5$

22 use synthetic division

$$f(x) = \frac{6x^2 - 6x + 7}{x - 7}$$

find slan asymptote

$$\begin{array}{r|rrr} 7 & 6 & -6 & 7 \\ & & 42 & 252 \\ \hline & 6 & 36 & 259 \end{array}$$

rem

$y = 6x + 36$ SLANT asymptote

(23) find vertical asymptote

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

set $x+8=0$

$$x+8-8 = 0-8$$

$$x = -8$$

vertical asymptote

(24) find vertical asymptote

$$f(x) = \frac{x-5}{x^2-11x+30}$$

Let $f(x) = \frac{(x-5)}{(x-5)(x-6)}$

$$f(x) = \frac{1\cancel{(x-5)}}{\cancel{(x-5)}(x-6)}$$

$$f(x) = \frac{1}{x-6}$$

hole at

$x-5=0$

$x-5+5=0+5$

$x=5$

Let $x-6=0$

$x-6+6=0+6$

$x=6$ only vertical asymptote

(25) find the horizontal asymptote

$$f(x) = \frac{10x}{5x^2+3}$$

y = horiz Asym = $\frac{10x}{5x^2}$

y = horiz Asym = $\frac{(2)(\cancel{5})x}{\cancel{5}x^2}$

y = horiz Asym = $\frac{2}{x}$

$$\lim_{x \to \infty} \frac{2}{x} = 0$$

horizontal asymptote

$y = 0$

(26) find the horizontal asymptote

$$g(x) = \frac{20x^2}{5x^2+6}$$

$$y = \text{horiz asym} = \frac{20\cancel{x^2}}{5\cancel{x^2}}$$

$$y = \text{horiz asym} = \frac{20}{5}$$

$$y = \text{horiz asym} = 4$$

$y = 4$ horizontal asymptote

27 Find the domain

$f(x) = \log(5-x)$

formula domain

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

set $Ax+B > 0$

set $5 - x > 0$

$\cancel{5} - x - \cancel{5} > 0 - 5$

$-x > -5$

$\frac{-x}{-1} < \frac{-5}{-1}$

divide by a negative turn alligator around

$x < 5$

$(-\infty, 5)$

28 expand

$\log_b\left(\frac{x^3y}{z^4}\right) =$

$\log_b(x^3y) - \log_b(z^4) =$

$\log_b(x^3) + \log_b(y) - \log_b(z^4) =$

$3\log_b(x) + \log_b(y) - 4\log_b(z) =$

formulas

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

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

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

(29) expand

$$\ln\left(\frac{x^9\sqrt{x^2+8}}{(x+8)^9}\right) =$$

$$\ln\left(x^9\sqrt{x^2+8}\right) - \ln(x+8)^9 =$$

$$\ln(x^9) + \ln\sqrt{x^2+8} - \ln(x+8)^9 =$$

$$\ln(x^9) + \ln(x^2+8)^{1/2} - \ln(x+8)^9 =$$

$$9\ln(x) + \frac{1}{2}\ln(x^2+8) - 9\ln(x+8) =$$

formulas

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

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

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

(30) Soln

$$4^{x+6} = 32^{x-3}$$

$$(2^2)^{x+6} = (2^5)^{x-3}$$ rewrite

$$2^{2x+12} = 2^{5x-15}$$

$$2x+12 = 5x-15$$

$$2x+\cancel{12}-\cancel{12} = 5x-15-12$$

$$2x = 5x-27$$

$$2x-5x = \cancel{5x}-27-\cancel{5x}$$

$$-3x = -27$$

$$\frac{-3x}{-3} = \frac{-27}{-3}$$

$$x = 9$$

formula

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

$$A^N = A^m$$

$$N = m$$

(31)

$$9e^{2x} = 1098$$

$$\frac{\cancel{9}e^{2x}}{\cancel{9}} = \frac{1098}{9}$$

$$e^{2x} = 122$$

$$\ln(e^{2x}) = \ln(122)$$

$$(2x)\ln(e) = \ln(122)$$

$$(2x)(1) = \ln(122)$$

$$2x = \ln(122)$$

$$\frac{\cancel{2}x}{\cancel{2}} = \frac{\ln(122)}{2}$$

$$x = \frac{\ln(122)}{2}$$

OR

$$x = 2.402010522$$

OR Round

$$x = 2.40$$

formulas:

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

$\ln(e) = 1$

(32) Solve

$$5^{x-1} = 474$$

$$\ln(5^{x-1}) = \ln(474)$$

$$(x-1)\ln(5) = \ln(474)$$

$$\frac{(x-1)\cancel{\ln(5)}}{\cancel{\ln(5)}} = \frac{\ln(474)}{\ln(5)}$$

$$x-1 = \frac{\ln(474)}{\ln(5)}$$

$$x-\cancel{1}\cancel{+1} = \frac{\ln(474)}{\ln(5)} + 1$$

$$x = \frac{\ln(474)}{\ln(5)} + 1$$

OR

$$x = 4.828173348$$

OR Round

$$x = 4.83$$

Formula

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

33 $\log_2 (x+23) = 6$

$2^6 = x+23$ rewrite

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = x+23$

$64 = x+23$

$64 - 23 = x + \cancel{23 - 23}$

$41 = x$

formula

$\log_b (y) = x$

$b^x = y$

(34) $\log_9(x) + \log_9(8x-1) = 1$

$\log_9 (x)(8x-1) = 1$

answer

$\left\{\frac{9}{8}\right\}$

$9^1 = x(8x-1)$

$9 = 8x^2 - x$

$0 = 8x^2 - x - 9$

$0 = (8x-9)(x+1)$

$8x - 9 = 0$ or $x + 1 = 0$

$8x - 9 + 9 = 0 + 9$ or $x + 1 - 1 = 0 - 1$

$8x = 9$ $\cancel{x = -1}$

$\frac{8x}{8} = \frac{9}{8}$

$x = 9/8$ Good

Check

$\log_9\left(\frac{9}{8}\right) + \log_9\left(8\left(\frac{9}{8}\right) - 1\right) = 1$

$\log_9\left(\frac{9}{8}\right) + \log_9(9-1) = 1$

$\log_9\left(\frac{9}{8}\right) + \log_9(8) = 1$

Good Good

Check

$\log_9(-1) + \log_9(8(-1)-1) = 1$

$\log_9(-1) + \log_9(-8-1) = 1$

$\log_9(-1) + \log_9(-9) = 1$

BAD BAD

Formula

$\log_9(A) + \log_9(B) = \log_9(AB)$

35

$\log_3(x-6) + \log_3(x+2) = 2$

$\log_3 (x-6)(x+2) = 2$

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

$9 = x^2 + 2x - 6x - 12$

$9 = x^2 - 4x - 12$

$0 = x^2 - 4x - 12 - 9$

$0 = x^2 - 4x - 21$

$0 = (x+3)(x-7)$

$x+3=0$ or $x-7=0$

$x+3-3=0-3$ or $x-7+7=0+7$

$\cancel{x=-3}$ or $x=7$

Possible

2, 1, 1

3, 7

answer

$\{7\}$

Check

$\log_3(-3-6) + \log_3(-3+2) = 2$

$\log_3(-9) + \log_3(-1) = 2$

BAD BAD

$\log_3(7-6) + \log_3(7+2) = 2$

$\log_3(1) + \log_3(9) = 2$

Good Good

Formula

$\log_3(A) + \log_3(B) = \log_3(AB)$

36

$$\log_2(x+11) - \log_2(x-4) = 4$$

$$\log_2\left(\frac{x+11}{x-4}\right) = 4$$

$$2^4 = \frac{x+11}{x-4}$$

$$2 \cdot 2 \cdot 2 \cdot 2 = \frac{x+11}{x-4}$$

$$\frac{16}{1} = \frac{x+11}{x-4}$$

$$16(x-4) = 1(x+11) \quad \text{cross mult}$$

$$16x - 64 = 1x + 11$$

$$16x - \cancel{64} + \cancel{64} = 1x + 11 + 64$$

$$16x = 1x + 75$$

$$16x - 1x = \cancel{1x} + 75 - \cancel{1x}$$

$$15x = 75$$

$$\frac{15x}{15} = \frac{75}{15}$$

$$x = 5$$

answer

$$\{5\}$$

Check

$$\log_2(5+11) - \log_2(5-4) = 4$$

$$\log_2(16) - \log_2(1) = 4$$

Good Good

Formula

$$\log_2(A) - \log_2(B) = \log_2\left(\frac{A}{B}\right) =$$

(37) $\cos(x) + \cos(x-5) = \cos(24)$

$\cos(x)(x-5) = \cancel{\cos}(24)$

$x(x-5) = 24$

$x^2 - 5x = 24$

$x^2 - 5x - 24 = 0$

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

let $x+3=0$ OR $x-8=0$

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

$\cancel{x=-3}$ OR $x=8$

Possible

24.1

12.2

6.4

3.8

Check

$\cos(x) + \cos(x-5) = \cos(24)$

$\cos(-3) + \cos(-3-5) = \cos(24)$

$\cos(-3) + \cos(-8) = \cos(24)$

BAD BAD

answer

$\{8\}$

$\cos(8) + \cos(8-5) = \cos(24)$

$\cos(8) + \cos(3) = \cos(24)$

Good Good Good

formula

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

$\cos(A) = \cos(B)$ then $A = B$

38.

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

$$25000 = 13000\left(1+\frac{.0675}{2}\right)^{2(t)}$$

$$25000 = 13000(1+.03375)^{2t}$$

$$25000 = 13000(1.03375)^{2t}$$

$$\frac{25000}{13000} = \cancel{\frac{13000(1.03375)^{2t}}{13000}}$$

$$1.923076923 = (1.03375)^{2t}$$

$$\ln(1.923076923) = \ln(1.03375)^{2t}$$

$$\ln(1.923076923) = 2t\ln(1.03375)$$

$$\frac{\ln(1.923076923)}{\ln(1.03375)} = \frac{2t\,\cancel{\ln(1.03375)}}{\cancel{\ln(1.03375)}}$$

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

$$19.70075349 = 2t$$

$$\frac{19.70075349}{2} = \frac{\cancel{2}t}{\cancel{2}}$$

$$9.850376745 = t$$

$$9.9 = t$$ Round

39

$$A = A_0 e^{-0.000121t}$$

$$25 = 100 e^{-0.000121t}$$

$$\frac{25}{100} = \frac{\cancel{100} e^{-0.000121t}}{\cancel{100}}$$

$$.25 = e^{-0.000121t}$$

$$\ln(.25) = \ln\left(e^{-0.000121t}\right)$$

$$\ln(.25) = -0.000121t \ln(e)$$

$$\ln(.25) = -0.000121t(1)$$

$$\ln(.25) = -0.000121t$$

$$\frac{\ln(.25)}{-0.000121} = \frac{\cancel{-0.000121}t}{\cancel{-0.000121}}$$

$$11456.97819 = t$$

formula

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

$\ln(e) = 1$

OR Round

$$11457 = t$$

(40)

$x + y + 8z = 38$
$x + y + 5z = 26$
$x - 8y - 2z = -29$

Use Graphing Calculator

2ND Matrix edit [A] 3X4

$$[A] = \begin{bmatrix} 1 & 1 & 8 & 38 \\ 1 & 1 & 5 & 26 \\ 1 & -8 & -2 & -29 \end{bmatrix}$$

2ND Quit

2ND matrix Math → rref

rref [A] = enter

$$\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 4 \end{bmatrix}$$

$(x, y, z) = (3, 3, 4)$

41. $a_n = \frac{2n}{n+6}$

$a_1 = \frac{2(1)}{1+6} = \frac{2}{7}$

$a_2 = \frac{2(2)}{2+6} = \frac{4}{8} = \frac{\cancel{4}(1)}{\cancel{4}(2)} = \frac{1}{2}$

$a_3 = \frac{2(3)}{3+6} = \frac{6}{9} = \frac{\cancel{3}(2)}{\cancel{3}(3)} = \frac{2}{3}$

$a_4 = \frac{2(4)}{4+6} = \frac{8}{10} = \frac{\cancel{2}(4)}{\cancel{2}(5)} = \frac{4}{5}$

42.

$$\sum_{k=1}^{3} k(k+2)$$

$$(1)(1+2)+(2)(2+2)+(3)(3+2)=$$

$$(1)(3)+(2)(4)+3(5)=$$

$$3+8+15=$$

$$11+15=$$

$$26=$$

43

use binomial theorem

$(2x-2)^3 =$

$_3C_0 (2x)^3(-2)^0 + {_3C_1} (2x)^2(-2)^1 + {_3C_2}(2x)^1(-2)^2 + {_3C_3}(2x)^0(-2)^3 =$

$(1)(2^3x^3)(1) + (3)(2^2x^2)(-2) + (3)(2^1x^1)(4) + (1)(1)(-8) =$

$(1)(8x^3)(1) + (3)(4x^2)(-2) + (3)(2x)(4) + (1)(-8) =$

$8x^3 - 24x^2 + 24x - 8 =$

use graphing calculator

3, Math, Prb, nCr, enter, 0, enter = 1

3, math, Prb, nCr, enter, 1, enter = 3

3, Math Prb, nCr, enter, 2, enter = 3

3, Math, Prb, nCr, enter, 3, enter = 1