Solve by factoring

M1314 TEST 1 Step

052217

(1)

$15x^2+26x+8=0$

$(3x+4)(5x+2)=0$

so $3x+4=0$ or $5x+2=0$

$3x+\cancel{4}-\cancel{4}=0-4$ or $5x+\cancel{2}-\cancel{2}=0-2$

$3x=-4$ or $5x=-2$

$\frac{3x}{3}=\frac{-4}{3}$ or $\frac{\cancel{5}x}{\cancel{5}}=\frac{-2}{5}$

$x=-4/3$ or $x=-2/5$

1.

Solve by the Quadratic formula

$15x^2+26x+8=0$

$a=15,\ b=26,\ c=8$

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

$$x=\frac{-(26)\pm\sqrt{(26)^2-4(15)(8)}}{2(15)}$$

$$x=\frac{-26\pm\sqrt{676-480}}{30}$$

$$x=\frac{-26\pm\sqrt{196}}{30}$$

$$x=\frac{-26\pm 14}{30}$$

$x=\frac{-26-14}{30}$ or $x=\frac{-26+14}{30}$

$x=\frac{-40}{30}$ or $x=\frac{-12}{30}$

$x=\frac{\cancel{10}(-4)}{\cancel{10}(3)}$ or $x=\frac{\cancel{6}(-2)}{\cancel{6}(5)}$

$x=\frac{-4}{3}$ or $x=-2/5$

$$\left\{\frac{-4}{3},\ \frac{-2}{5}\right\}$$

2.

$$1x^2 - 6x + 25 = 0$$

$a = 1$, $b = -6$, $c = 25$

(2)

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

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(25)}}{2(1)}$$

$$x = \frac{6 \pm \sqrt{36 - 100}}{2}$$

$$x = \frac{6 \pm \sqrt{-64}}{2}$$

$$x = \frac{6 \pm 8i}{2}$$

$$x = 3 \pm 4i$$

$x = 3 + 4i$ or $x = 3 - 4i$

3.

$\sqrt{18x+9} = x+5$

$(\sqrt{18x+9})^2 = (x+5)^2$

$18x+9 = (x+5)(x+5)$

$18x+9 = x^2+5x+5x+25$

$18x+9 = x^2+10x+25$

$0 = x^2+10x+25-18x-9$

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

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

set $x-4=0$ or $x-4=0$

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

$x=4$ Good or $x=4$

ck $\sqrt{18x+9} = x+5$

$\sqrt{18(4)+9} = (4)+5$

$\sqrt{72+9} = 4+5$

$\sqrt{81} = 9$

$9 = 9$

Good

$\{4\}$

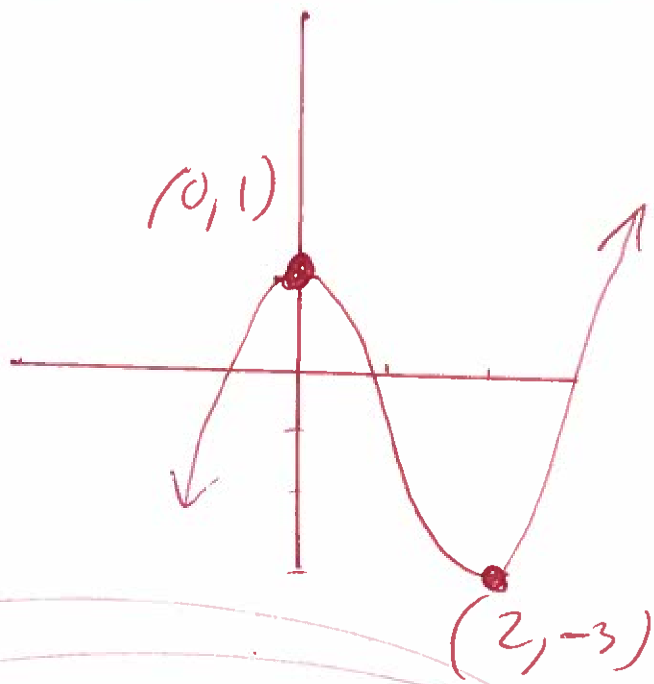
3.

4. Find the relative maximum and minimum

$f(x) = x^3 - 3x^2 + 1$

use a graphing calculator

$y_1 = x \wedge 3 - 3x \wedge 2 + 1$



Maximum (0,1)

minimum (2,-3)

5.

graph

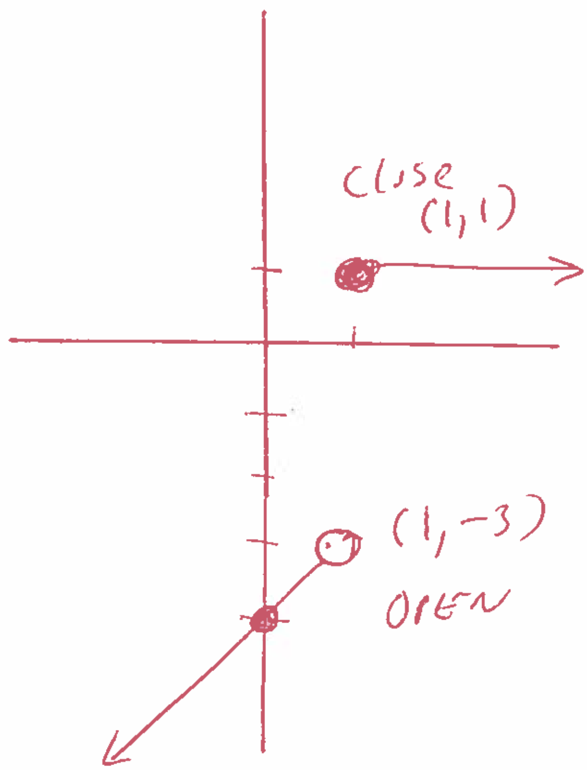
$$f(x) = \begin{cases} x-4 & \text{if } x<1 \\ 1 & \text{if } x \geq 1 \end{cases}$$

5.

use a graphing calculator 2ND math

$Y_1 = X - 4 \div (X < 1)$ OPEN

$Y_2 = 1 \div (X \geq 1)$ Close



6. $f(x) = x^2 + 7x - 3$

6.

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

$$\frac{((x+h)^2 + 7(x+h) - 3) - (x^2 + 7x - 3)}{h} =$$

$$\frac{(x+h)(x+h) + 7x + 7h - 3 - x^2 - 7x + 3}{h} =$$

$$\frac{x^2 + xh + xh + h^2 + 7x + 7h - 3 - x^2 - 7x + 3}{h} =$$

$$\frac{1xh + 1xh + h^2 + 7h}{h} =$$

$$\frac{2xh + h^2 + 7h}{h} =$$

$$2x + h + 7 =$$

7. graph

$h(x) = |x-3|-3$

$h(2) = |2-3|-3$

$h(2) = |-1|-3$

$h(2) = 1-3$

$h(2) = -2$

$h(3) = |3-3|-3$

$h(3) = |0|-3$

$h(3) = 0-3$

$h(3) = -3$

$h(4) = |4-3|-3$

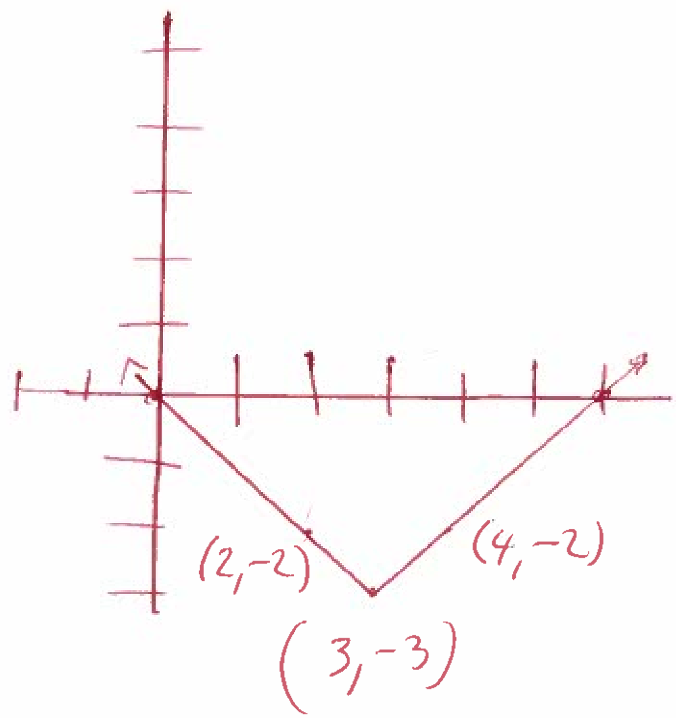
$h(4) = |1|-3$

$h(4) = 1-3$

$h(4) = -2$

x	$h(x)$
2	-2
3	-3
4	-2

7.



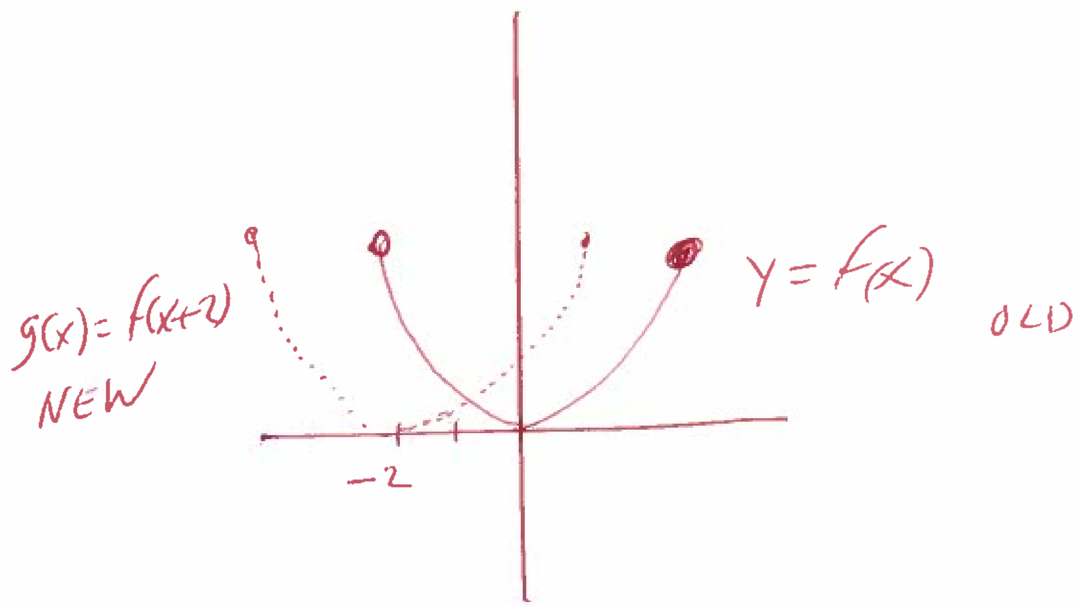
8.

graph

$g(x) = f(x+2)$

Shift left 2

8.



9. Find the domain

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

set $3-x \geq 0$

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

$-x \geq -3$

$\frac{-x}{-1} \leq \frac{-3}{-1}$

$x \leq 3$

3

$(-\infty, 3]$

formula domain

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

set $Ax+B \geq 0$

9.

10. $f(x) = 3x+2$ and $g(x) = 2x+8$

Find $fg =$

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

$(3x+2)(2x+8) =$

$6x^2 + 24x + 4x + 16 =$

$6x^2 + 28x + 16 =$

10.

11. $f(x) = 3x + 11$ and $g(x) = 5x - 1$

11.

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

$f(g(x)) =$

$f(5x-1) =$

$3(5x-1) + 11 =$

$15x - 3 + 11 =$

$15x + 8 =$

12 $f(x) = 4x^2 + 2x + 8$ and $g(x) = 2x - 6$ 12.

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

$g(f(x)) =$

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

$2(4x^2 + 2x + 8) - 6 =$

$8x^2 + 4x + 16 - 6 =$

$8x^2 + 4x + 10 =$

(13.) Find distance

$(-1, -5)$ and $(-7, 3)$

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

(13.)

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

$$d = \sqrt{((-1) - (-7))^2 + ((-5) - (3))^2}$$

$$d = \sqrt{(-1+7)^2 + (-5-3)^2}$$

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

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

$$d = \sqrt{100}$$

$$d = 10$$

14 Find midpoint 14

$(1, 7)$ and $(7, 8)$

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

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

$$\text{Midpoint} = \left(\frac{(1)+(7)}{2}, \frac{(7)+(8)}{2} \right)$$

$$\text{Midpoint} = \left(\frac{8}{2}, \frac{15}{2} \right)$$

$$\text{Midpoint} = \left(4, \frac{15}{2} \right)$$

15. graph

15.

$$x^2+y^2-10x-12y+57=0$$

$$x^2-10x+y^2-12y=-57$$

$$x^2-10x+\left(\tfrac{1}{2}(-10)\right)^2+y^2-12y+\left(\tfrac{1}{2}(-12)\right)^2=-57+\left(\tfrac{1}{2}(-10)\right)^2+\left(\tfrac{1}{2}(-12)\right)^2$$

$$x^2-10x+(-5)^2+y^2-12y+(-6)^2=-57+(-5)^2+(-6)^2$$

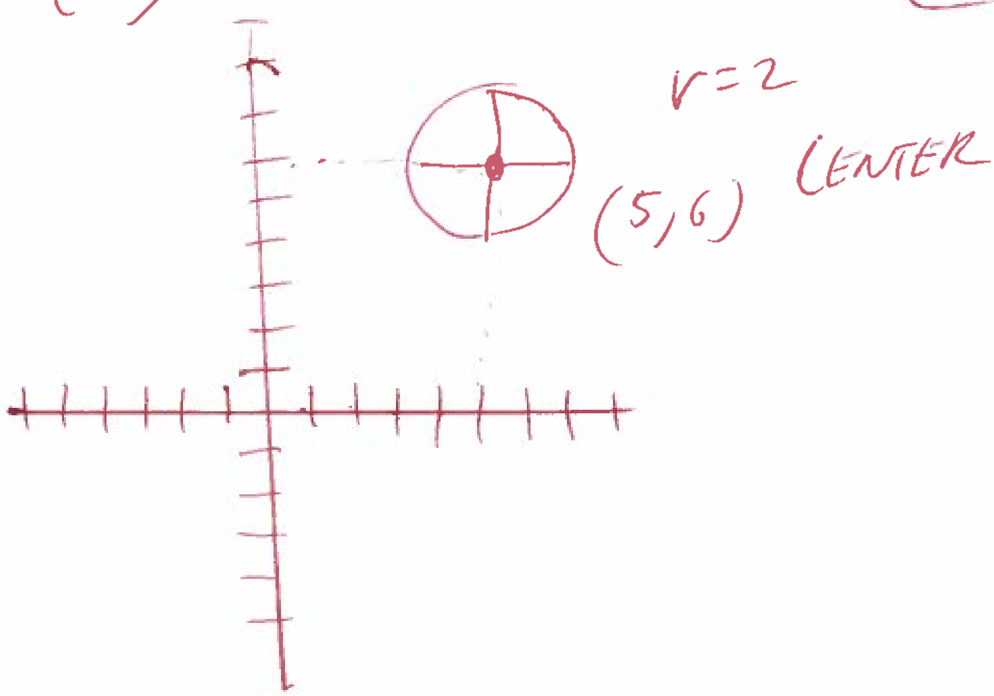
$$\underbrace{x^2-10x+25}+y^2-12y+36=-57+25+36$$

$$(x-5)(x-5)+(y-6)(y-6)=4$$

$$(x-5)^2+(y-6)^2=4$$

opp   opp

CENTER $=(5,6)$ radius $=\sqrt{4}=2$



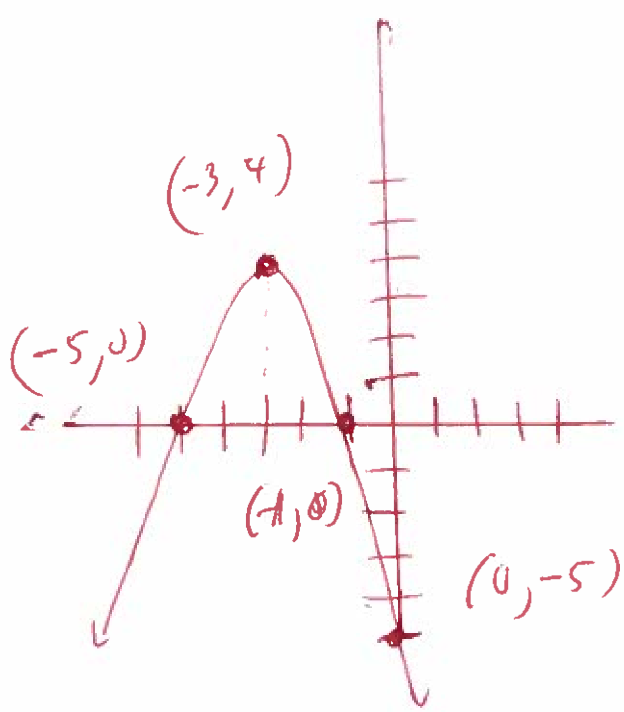
16. graph

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

16.

use graphing calculator

$Y_1 = -X \wedge 2 - 6X - 5$



x intercepts (-5, 0) (-1, 0)

y intercept (0, -5

Vertex = max = (-3, 4)

axis x = -3

17. Find Max 17.

$h(x) = -16x^2 + 160x$

$a = -16, \quad b = 160, \quad c = 0$

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

$\text{Vertex} = \left(\frac{-(160)}{2(-16)}, f\left(\frac{-(160)}{2(-16)}\right)\right)$

$\text{Vertex} = \left(\frac{-160}{-32}, f\left(\frac{-160}{-32}\right)\right)$

$\text{Vertex} = (5, f(5))$

$\text{Vertex} = (5, -16(5)^2 + 160(5))$

$\text{Vertex} = (5, -16(5)(5) + 160(5))$

$\text{Vertex} = (5, -16(25) + 160(5))$

$\text{Vertex} = (5, -400 + 800)$

$\text{Vertex} = (5, 400)$

$\text{Max} = 400$

18. $1x^3+2x^2-9x-18=0$

$\pm 18, \pm 9, \pm 6, \pm 3, \pm 2, \pm 1$
Possible

18.

use synthetic division

$$\begin{array}{r|rrrr} 3 & 1 & 2 & -9 & -18 \\ & & 3 & 15 & 18 \\ \hline & 1 & 5 & 6 & 0 \end{array}$$

$x^2+5x+6=0$

$(x+2)(x+3)=0$

set $x+2=0$ OR $x+3=0$

$x+2-2=0-2$ OR $x+\cancel{3}-\cancel{3}=0-3$

$x=-2$ OR $x=-3$

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

19. $1x^3+6x^2-14x+16=0$

$\pm 16, \pm 8, \pm 4, \pm 2, \pm 1$ possible

19.

$$\begin{array}{r|rrrr} -8 & 1 & 6 & -14 & 16 \\ & & -8 & 16 & -16 \\ \hline & 1 & -2 & 2 & 0 \end{array}$$

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

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

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

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

$$x=\frac{2\pm\sqrt{4-8}}{2}$$

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

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

$x=1\pm 1i$

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

$\{-8, 1+i, 1-i\}$

(20) Find vertical asymptotes

(20.)

$$\frac{x-81}{x^2-12x+35}$$

set $x^2-12x+35=0$

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

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

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

$x=5$ or $x=7$

21. Find the horizontal asymptote

$$g(x) = \frac{9x^2 - 3x - 7}{6x^2 - 8x + 7}$$

21.

$$y = HA = \frac{9\cancel{x^2}}{6\cancel{x^2}}$$

$$y = \frac{9}{6}$$

$$y = \frac{\cancel{3}(3)}{\cancel{3}(2)}$$

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

22. Find the slant asymptote

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

opp

$$\begin{array}{r|rrr} 8 & 1 & 8 & -8 \\ & & 8 & 128 \\ \hline & 1 & 16 & 120 \end{array}$$

120 rem

22.

use synthetic division

$$y = x + 16$$

23

$f(x) = 188e^{0.048x}$

23

$f(8) = 188e^{0.048(8)}$

$f(8) = 188e^{.384}$

$f(8) = 188(1.468145442)$

$f(8) = 276.011343$

OR

Round

$f(8) \equiv 276$

24

$D(h) = 9e^{-0.4h}$ 2ND LN

24

$D(10) = 9e^{-0.4(10)}$

$D(10) = 9e^{-4}$

$D(10) = 9(.0183156389)$

$D(10) = .16484075$

OR Round

$D(10) = .16$

25. Find the domain

$f(x) = \ln(4-x)$

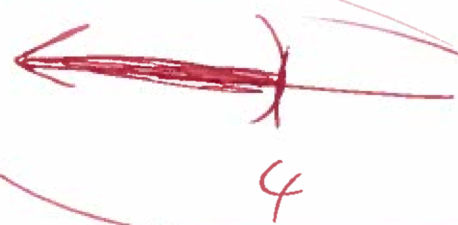
set $4 - x > 0$

$\cancel{4} - x - \cancel{4} > 0 - 4$

$-x > -4$

$\frac{-x}{-1} < \frac{-4}{-1}$

$x < 4$



$(-\infty, 4)$

domain formula

25.

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

set $Ax+B > 0$