Semester 1 Finals Review Day 2

Rewrite using the rules of i

1. $i^{24} =$ 1 $24/4$ R0

2. $i^{30} =$ -1 $30/4$ R2

Simplify

3. $(7-2i)(3-5i)$

$21-6i-35i+10i^2$

$21-41i-10$

$\boxed{11-41i}$

4. $3(6+9i)-4(2+2i)$

$18+27i-8-8i$

$\boxed{10+19i}$

5. $(-8+5i)+(7-2i)$

$\boxed{-1+3i}$

6. $\frac{4+2i}{7+i}\left(\frac{7-i}{7-i}\right)$

$\frac{28+14i-4i-2i^2}{49-i^2}$

$\frac{30+10i}{50} = \boxed{\frac{3+i}{5}}$

Use square roots to solve each quadratic equation.

7. $x^2 = 40$

$x = \pm\sqrt{40}$

$\boxed{x = \pm 2\sqrt{10}}$

8. $(x+2)^2 = -49$

$x+2 = \pm 7i$

$\boxed{x = -2 \pm 7i}$

9. Given $f(x) = 3x - x^6 + 6x^4 - x^5 + 7x$ complete the following.

Standard Form:

$y = -x^6 - x^5 + 6x^4 + 10x$

Degree:

6

Leading Coefficient:

-1

Number of Terms:

4

End Behavior:

down-down

10. Let $f(x)=6-2x$, $g(x)=2x^2+3x-1$, $k(x)=3x+4$, and $m(x)=-x^2-2x+9$

A. $g(x)-5m(x)$

$2x^2+3x-1-5(-x^2-2x+9)$

$2x^2+3x-1+5x^2+10x-45$

$\boxed{7x^2+13x-46}$

B. $f(x)\cdot g(x)\cdot k(x)$

$(6-2x)(2x^2+3x-1)(3x+4)$

$12x^2+18x-6-4x^3-6x^2+2x$

$(-4x^3+6x^2+20x-6)(3x+4)$

$-12x^4+18x^3+60x^2-18x-16x^3+24x^2+80x-24$

$=\boxed{-12x^4+2x^3+84x^2+62x-24}$

11. You are trying to plan a babysitting club with your friends and want to maximize your profit. If you charge \$18 per hour, you have 10 families that you babysit. You know that if you increase your hourly pay by \$2 you lose one family. Write an equation to model this in standard form and figure out how much you should charge to maximize your income.

$(18+2x)(10-x)=0$

$180+20x-18x-2x^2=0$

$-2x^2+2x+180=0$

$x=-2/2(-2)=1/2$

price: $18+2(1/2)=\boxed{\$19}$

12. Expand $(2x-3)^4$. You must use the Binomial Theorem. 14641

$1(2x)^4(-3)^0+4(2x)^3(-3)^1+6(2x)^2(-3)^2+4(2x)(-3)^3+1(2x)^0(-3)^4$

$16x^4-96x^3+216x^2-216x+81$

13. Graph $y=x^9(3x-7)^4(4-x)(x+5)^2$

LC: -81

D: 16

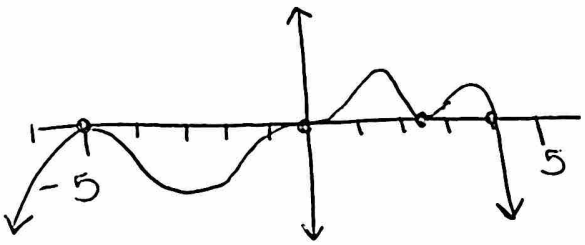
EB:

$x=0$ (SB)

$x=7/3$ (B)

$x=4$ (S)

$x=-5$ (B)



14. Fully factor $f(x)=x^3+3x^2-73x-315$ if $x=-5$ is an x-intercept of $f(x)$.

$$\begin{array}{r|l} & x^2-2x-63 \\ \hline x+5 & x^3+3x^2-73x-315 \\ & -(x^3+5x^2) \\ \hline & -2x^2-73x-315 \\ & -(-2x^2-10x) \\ \hline & -63x-315 \\ & -(-63x-315) \\ \hline & 0 \end{array}$$

$\boxed{(x+5)(x-9)(x+7)}$

15. Use long division $4x^3+3x-7$ by $x-2$

$$\begin{array}{r|l} & 4x^2+8x+19 \\ \hline x-2 & 4x^3+0x^2+3x-7 \\ & -(4x^3-8x^2) \\ \hline & 8x^2+3x-7 \\ & -(8x^2-16x) \\ \hline & 19x-7 \\ & -(19x-38) \\ \hline & 31 \end{array}$$

$\boxed{4x^2+8x+19+\frac{31}{x-2}}$

16. Factor $16x^4 - 36y^2$

$$(\overset{4}{\cancel{8}}x^2 - 6y)(\overset{4}{\cancel{8}}x^2 + 6y)$$

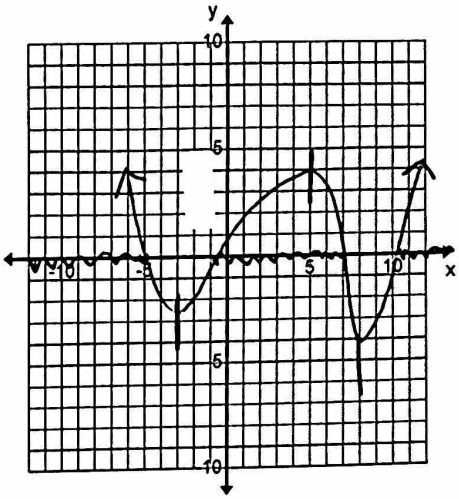
17. Sketch a graph that meets the following qualifications.

$f(x)$ is positive from $(-\infty,-5)$ & (-1,7) & $(10,\infty)$

$f(x)$ is negative from (-5,-1) & (7,10)

$f(x)$ is increasing from (-3,5) & $(8,\infty)$

$f(x)$ is decreasing from $(-\infty,-3)$ & (5,8)



18. Given $f(x) = \dfrac{1}{x-3} + 5$ draw the graph

Transformations:

R3 U5

Asymptotes:

$x = 3$

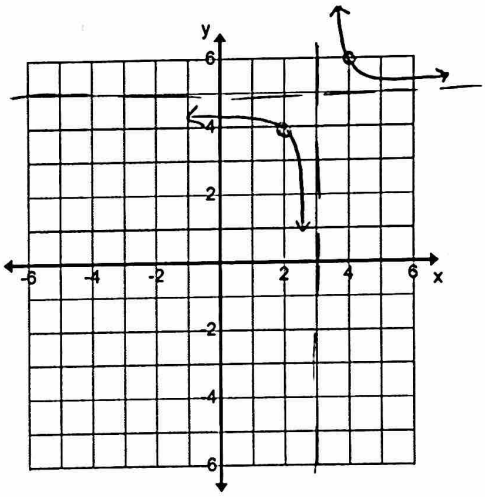
$y = 5$

Domain:

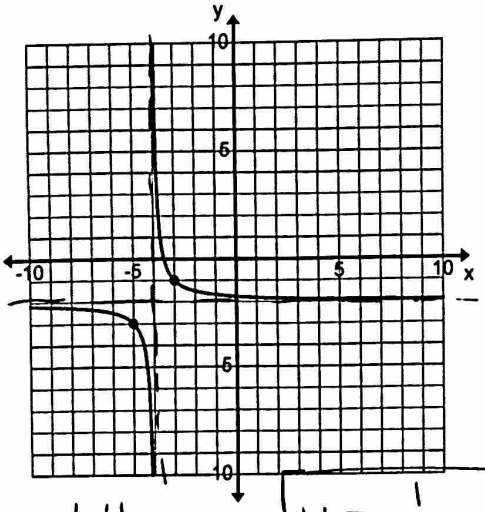
$(-\infty, 3) \cup (3, \infty)$

Range:

$(-\infty, 5) \cup (5, \infty)$



19. Given the graph below, find the equation.



L4
D2

$$\boxed{y = \frac{1}{x+4} - 2}$$

20. Solve by completing the square: $x^2 - 18x + 1 = 0$

$(x^2 - 18x + 81) - 81 + 1 = 0$

$(x-9)^2 - 80 = 0$

$(x-9)^2 = 80$

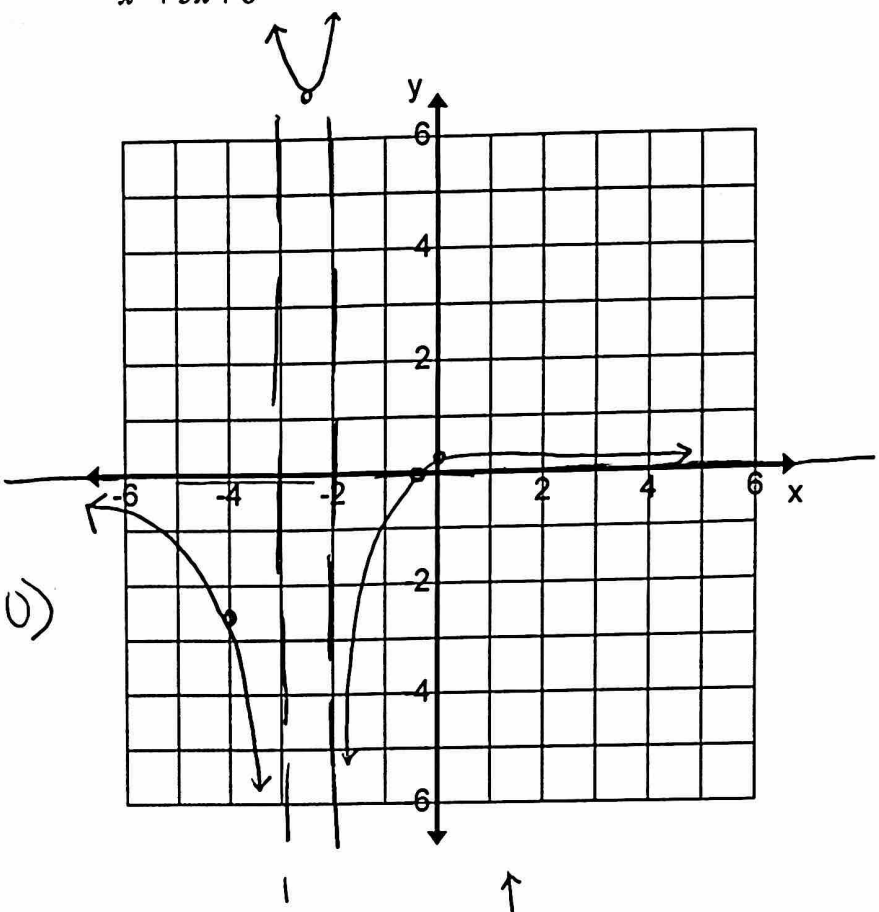
$x - 9 = \pm\sqrt{80}$

$x - 9 = \pm 4\sqrt{5}$

$$\boxed{x = 9 \pm 4\sqrt{5}}$$

21. Given this equation, find the following pieces of information:

$$f(x)=\frac{2x+1}{x^2+5x+6}$$



Horizontal Asymptote

$y=\frac{\text{small}}{\text{big}}$ $y=0$

Vertical Asymptote(s)

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

$x=-2,\ x=-3$

X-intercept(s):

$2x+1=0$

$x=-1/2$ $(-1/2,0)$

Y-intercept:

$(0,1/6)$

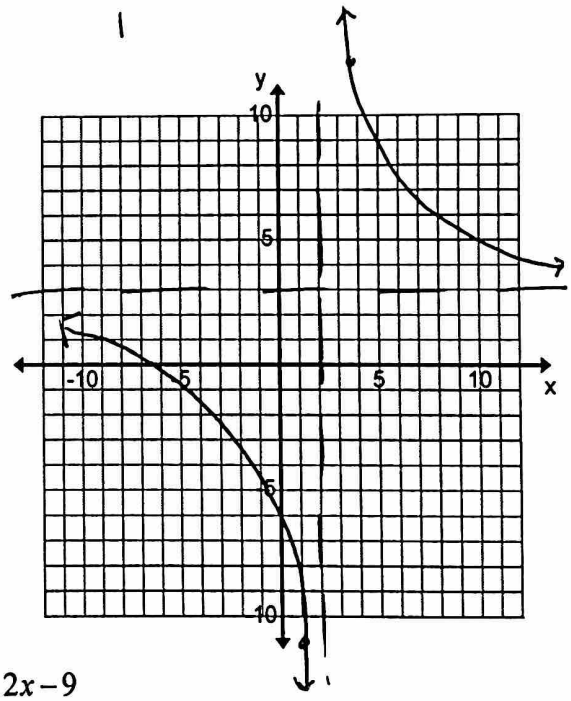
Graph!

X	Y
-2.5	16
-4	-3.5

22. Reduce $y=\frac{3x+8}{x-2}$ long division then graph.

$$\begin{array}{r} 3 \\ x-2\overline{)\,3x+8} \\ -\ \ 3x-6 \\ \hline 14 \end{array}$$

$y=\frac{14}{x-2}+3$



23. Complete the square and then state the vertex: $2x^2+12x-9$

$2(x^2+6x+9)-18-9$

$2(x+3)^2-27$

$V:(-3,-27)$