Name: _____ Practice
Block: _____

Algebra 2/Trig H

Collection of problems as practice for the final

(Practice)

Remember:

1. The final-test has only 30 questions. Some with multiple parts.
2. You should SHOW YOUR WORK for all parts of the answer to receive full credit.
3. Clearly indicate (underline/ box/highlight) your final answer. Only ONE answer per question will be considered.

The use of calculator is NOT allowed.

Good luck!!
Dr. Baharav

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1. Simplify:

$(2x-3)\cdot(4x^2+6x+9)-(4x^2-3)$

$(A-B)(A^2+AB+B^2)$

$8x^3-27-4x^2+3=$

$8x^3-4x^2-24$

$8x^3-27-4x^2+3=8x^3-4x^2-24$

2. Simplify:

$(2x-3)\cdot(2x+3)-(x+4)(2x-8)$

$(x+4)(x-4)\cdot 2$

$4x^2-9-2x^2+32 \quad x^2-16$

$=2x^2+23$

$4x^2-9-2x^2+32=2x^2+23$

3. Factor completely:

$8x^3+27$

$(2x+3)(4x^2-6x+9)$

$(2x+3)(4x^2-6x+9)$

4. Factor completely:

$x^2-8x+15$

MATH

$(x-5)(x-3)$

$(x-5)(x-3)$

5. Factor completely:

$18x^3-8x$

$2x(9x^2-4)=$

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

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

6. Factor completely:

$6x^2-19x+15$

M	A	T
90	-19	-9, -10

$6x^2-9x-10x+15$

$3x(2x-3)-5(2x-3)$

$(3x-5)(2x-3)$

$(3x-5)(2x-3)$

7. Simplify and give restricted values:

$$\frac{x^2-4}{x-3}\cdot\frac{x^2-9}{x^2+5x+6}$$

$\frac{(x+2)(x-2)}{(x-3)}\cdot\frac{(x-3)(x+3)}{(x+3)(x+2)}=x-2$

$x\neq 3,-3,-2$

$$\frac{(x+2)(x-2)}{x-3}\cdot\frac{(x-3)(x+3)}{(x+3)(x+2)}=x-2$$

1. Simplify :

$$\frac{(x^3-y^3)}{2}\div\frac{2x^3y-2xy^3}{x+y}$$

$\frac{(x-y)(x^2+xy+y^2)}{2}\cdot\frac{(x+y)}{2xy(x+y)(x-y)}$

$=\frac{x^2+xy+y^2}{4x^2y}$

$$\frac{(x-y)(x^2+xy+y^2)}{2x}\cdot\frac{(x+y)}{2xy(x+y)(x-y)}=\frac{x^2+xy+y^2}{4x^2y}$$

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8. Simplify and give restricted values:

$$\frac{1}{x-4} - \frac{x-1}{x+4} - \frac{6x-16}{x^2-16}$$

$\frac{(x+4) - x^2 + 5x - 4 - 6x + 16}{(x-4)(x+4)} =$

$= \frac{-x^2+16}{(x-4)(x+4)} = \boxed{-1}$

$$\frac{x+4-x^2+5x-4-6x+16}{x^2-16} = -1$$

9. Simplify:

$$\frac{1}{x-4} - \frac{x-1}{x^2-x-12}$$

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

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

10. Solve:

$$\frac{2}{x^2-9} - \frac{2}{x+3} = \frac{x-4}{x-3}$$

$\frac{2}{x^2-9} - \frac{2}{x+3} - \frac{x-4}{x-3} = 0$

$\frac{2-2x+6-x^2+x+12}{(x+3)(x-3)} = 0$

$x^2+x-20=0$

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

$x^2 + x - 20 = 0$

$x = -5 \text{ or } x = 4$

$\boxed{x=-5 \text{ or } x=4}$

11. Solve:

$$\frac{2}{x^2-3x-4} = \frac{1}{x^2-5x+4}$$

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

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

$\boxed{x=3}$

check: $\frac{2}{9-9-4} \stackrel{?}{=} \frac{1}{9-15+4}$

$-\frac{1}{2} \stackrel{?}{=} -\frac{1}{2}$ ✓

$2(x-1) = x+1 \Rightarrow x = 3$

12. Solve:

$$\frac{7}{5x-1} = \frac{1}{(x+1)}$$

$7x+7 = 5x-1$

$2x = -8$

$\boxed{x=-4}$

$x = -3$

check: $\frac{7}{-21} \stackrel{?}{=} \frac{1}{-3}$ ✓

13. Divide using synthetic division:

$$(x^5 + 5x^4 - x^3 - 3x^2 + 5x - 25) \div (x+5)$$

$-5 \mid 1 \;\; 5 \;\; -1 \;\; -3 \;\; 5 \;\; -25$

$\quad\quad\;\; -5 \;\; 0 \;\; 5 \;\; -10 \;\; 25$

$\quad 1 \;\; 0 \;\; -1 \;\; 2 \;\; -5 \;\; \| \;\; 0$

$\boxed{x^4 - x^2 + 2x - 5}$

$x^4 - x^2 + 2x - 5$

check

$x=4$: $\frac{2}{7} - \frac{2}{7} \stackrel{?}{=} \frac{4-4}{1}$

$0 \stackrel{?}{=} 0$ ✓

$x=-5$: $\frac{2}{16} - \frac{2}{-2} \stackrel{?}{=} \frac{-4}{-8}$

$\frac{1}{8} + 1 \stackrel{?}{=} \frac{4}{8}$ ✓

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14. Divide

$$\frac{30x^8 - 15x^6 + 40x^4}{5x^4}$$

$6x^4 - 3x^2 + 8$

15. Divide:

$$\frac{\left(\frac{1}{x-4} - \frac{1}{x+4}\right)}{\left(\frac{1}{x-4} + \frac{1}{x+4}\right)}$$

$\frac{4}{x}$

16. Divide using synthetic division:

$(x^5 - 32) \div (x - 2)$

$x^4 + 2x^3 + 4x^2 + 8x + 16$

17. Divide :

$(64y^3 - 8) \div (4y - 2)$

$(16y^2 + 8y + 4)$

18. Simplify:

$$\sqrt[4]{\frac{64x^5y^7}{36xy^2}}$$

$\frac{2}{3}|x|y\sqrt[4]{9y}$

19. Complete the three missing boxes

$$\sqrt[3]{\frac{81x^8y^{-3}}{z^2}} = \frac{3 \cdot \square}{\square \cdot z} \cdot \sqrt[3]{\square x^2 z}$$

$\frac{3x^2}{yz}\sqrt[3]{3x^2z}$

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20. Simplify:

$$2\sqrt{32} - \sqrt{50} + \sqrt{162}$$

$2\sqrt{16}\sqrt{2} - \sqrt{25}\sqrt{2} + \sqrt{81}\sqrt{2}$

$= \sqrt{2}(8 - 5 + 9) = \boxed{12\sqrt{2}}$

$12\sqrt{2}$

21. Simplify :

$$\sqrt[3]{24} - \sqrt[3]{81}$$

$\sqrt[3]{3}\cdot\sqrt[3]{8} - \sqrt[3]{27}\cdot\sqrt[3]{3} =$

$= \sqrt[3]{3}\cdot(2 - 3) = \boxed{-\sqrt[3]{3}}$

$-\sqrt[3]{3}$

22. Simplify (rationalize denominator)

$$\frac{\sqrt{3} + 5}{7 + \sqrt{3}}$$

$\frac{(\sqrt{3}+5)}{(7+\sqrt{3})}\frac{(7-\sqrt{3})}{(7-\sqrt{3})} = \frac{2\sqrt{3}+35-3}{49-3} =$

$= \frac{2\sqrt{3}+32}{46} = \boxed{\frac{\sqrt{3}+16}{23}}$

$\frac{\sqrt{3} + 16}{23}$

23. Simplify (rationalize denominator)

$$\frac{4 - 2i}{4 + 2i}$$

$\frac{(4-2i)}{(4+2i)}\frac{(4-2i)}{(4-2i)} = \frac{16-16i-4}{16+4}$

$= \frac{12-16i}{20} = \boxed{\frac{3}{5} - \frac{4}{5}i}$

$\frac{3}{5} - \frac{4}{5}i$

24. Simplify

$$(\sqrt{-9} + \sqrt{9}) \cdot (\sqrt{4} + \sqrt{-4})$$

$(3i + 3)(2 + 2i) =$

$= 12i + 6 + 6i^2 = \boxed{12i}$

$12i$

25. Simplify

$$2i \cdot (\sqrt{-9} + \sqrt{9}) + i \cdot (\sqrt{4} + \sqrt{-4})$$

$i(2\cdot(3i+3) + (2+2i)) =$

$= i(8 + 8i) = \boxed{-8 + 8i}$

$-8 + 8i$

26. Solve and check

$$x - 5 = \sqrt{x + 7}$$

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

$x^2 - 10x + 25 = x + 7$

$x^2 - 11x + 18 = 0$

$(x-9)(x-2)$

$\boxed{x = 9}$ or $x = 2$

$x = 9$

Works

Doesn't check

27. Solve and check

$$\sqrt{x + 7} + 8 = x + 3$$

exactly the same!

$x = 9$

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28. Solve:

$$x^2 - 81 = 0$$

$x = \pm 9$

$x = +9 \text{ or } x = -9$

29. Solve :

$$x^2 - 81x = 0$$

$x(x-81)=0$

$x=0$ or $x=81$

$x = 0 \text{ or } x = 81$

30. Solve

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

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

$\frac{4 \pm \sqrt{16-12}}{2} = \frac{4 \pm 2}{2} = 2 \pm 1 \to 3, 1$

$\frac{\sqrt{3}+16}{23}$ $x=3$ or $x=1$

31. Solve

$$\frac{1}{2}y^2 - 3y + 9 = 0$$

$y^2-6y+18=0$

$\frac{6 \pm \sqrt{36-72}}{2} = \frac{6 \pm \sqrt{-36}}{2} = 3 \pm 3i$

$3 \pm 3i$

32. Solve

$$x^2 - 4x + 1 = 0$$

$\frac{4 \pm \sqrt{16-4}}{2} = \frac{4 \pm \sqrt{12}}{2} = \frac{4 \pm 2\sqrt{3}}{2} = 2 \pm \sqrt{3}$

$2 \pm \sqrt{3}$

33. Solve

$$x^2 + 81 = 0$$

$x^2 = -81$

$x = \pm 9i$

$x = \pm 9i$

34. Find three consecutive integers such that the square of the first plus the product of the other two is 46.

$x, x+1, x+2.$

$x^2 + (x+1)(x+2) = 46$

$x^2 + x^2 + 3x + 2 = 46$

$2x^2 + 3x + 2 = 46$

$2x^2 + 3x - 44 = 0$

$\frac{-3 \pm \sqrt{9+352}}{4} = \frac{-3 \pm \sqrt{361}}{4} = \frac{-3 \pm 19}{4} =$

$= \{4, -5\frac{1}{2}\}$ x

4,5,6

4, 5, 6

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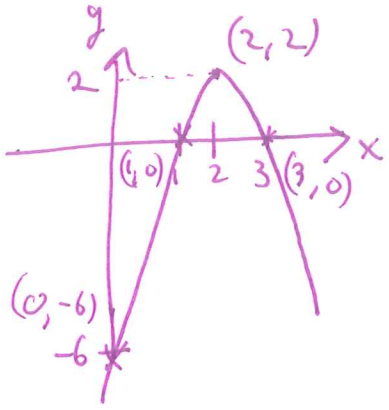
Graph the following functions. Indicate (if relevant) x-intercepts, y-intercepts, vertex, and any other significant points.

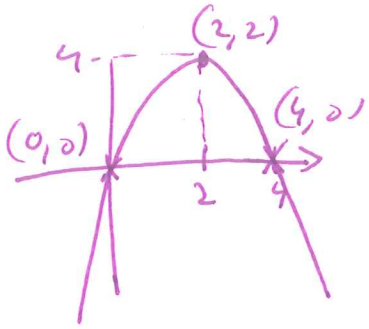
35.

$$f(x) = 2 \cdot (1 - x) \cdot (x - 3)$$



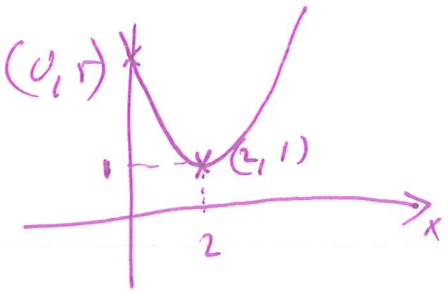
36.

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



37.

$$f(x) = x^2 - 4x + 5$$



38.

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

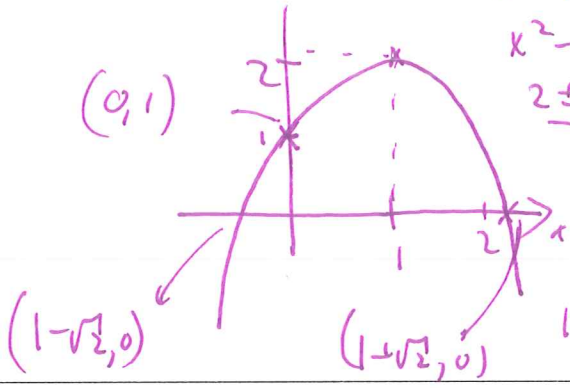
$-x^2 + 2x + 1 = 0$

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

$\frac{2 \pm \sqrt{4 + 4}}{2} =$

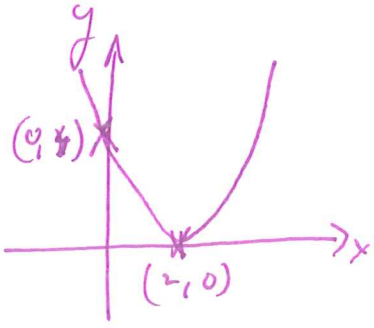
$\frac{2 \pm \sqrt{8}}{2} =$

$1 \pm \sqrt{2}$



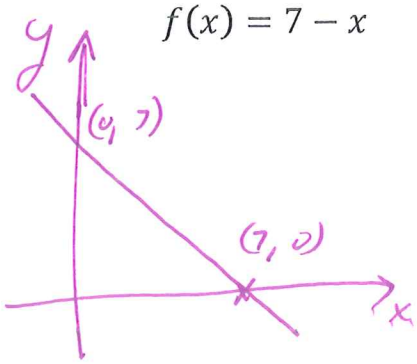
39.

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



40.

$$f(x) = 7 - x$$



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41. Graph the following function

$$f(x) = x^6 + 3x^5 + 2x^4 - x^2 - 3x - 2$$

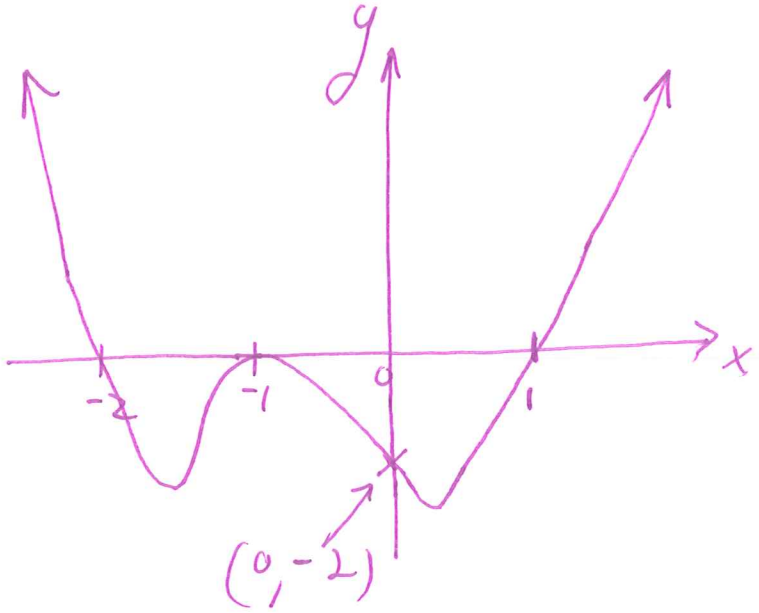
Hint: The function has roots at -2, 1, -1, and i.

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

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

Leading coeff: +

degree: 6



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

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42. The sum of two even numbers is 16. Find the numbers such that their product is maximum.

$2x + 2y = 16 \Rightarrow x + y = 8$

even even

$P = 2x \cdot 2y \longrightarrow$ maximum

8

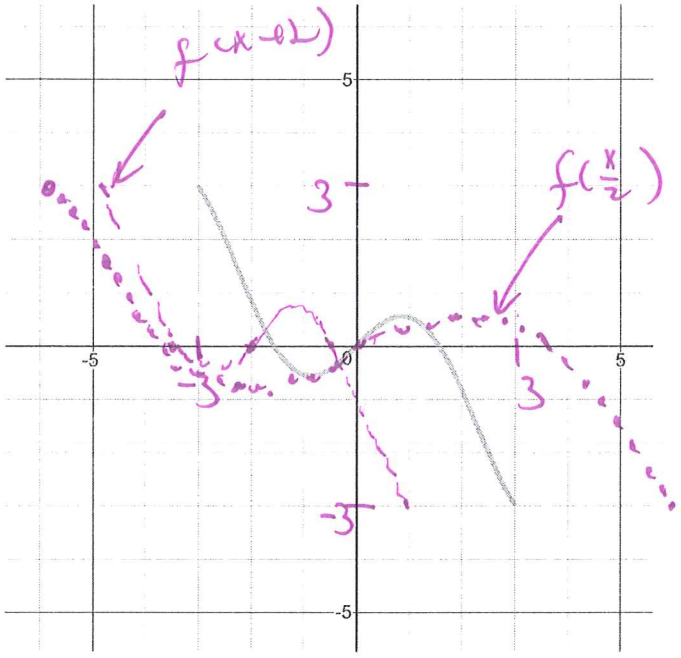
$P = 4xy = 4x(8-x)$

$= 4[-x^2 + 8x]$

$h = \frac{-b}{2a} = \frac{-8}{-2} = 4.$

$\Rightarrow \boxed{x = 8 \Rightarrow y = 8}$

43. Given the function $f(x)$:



Find Range and Domain: Domain: $[-3, 3]$ Range: $[-3, 3]$.

Is the function Even/Odd? Odd: $f(x) = -f(-x)$.

Graph $f(x+2)$. Range and Domain: Domain $[-5, 1]$, Range $[-3, 3)$.

Graph $f\left(\frac{x}{2}\right)$. Range and Domain: $[-6, 6]$ Ry $[-3, 3]$

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44. Solve for x:

a. $x = \log_2 64$

$x = 6$

$x = 6$

b. $2 = \log_7 x$

$x = 49$

$x = 49$

c. $2^{x+2} = 32$

$x = 3$

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

$x = 3$

45. Solve for x:

a. $x^2 = \log_2 16$

$x = \pm 2$

$x^2 = 4$

$x = \pm 2$

b. $2 = \log_7 (x^2)$

$x = \pm 7$

$x = \pm 7$

c. $2^{(x^2)} = 64$

$x = \pm 3$

$2^{x^2} = 2^6$

$x = \pm\sqrt{6}$

46. Calculate the following.

a. $\log 4 + \log 250$

$\log(1000) = 3$

3

b. $\log_2 3 - \log_2 48$

$\log_2\left(\frac{1}{16}\right) = -4$

-4

c. $\log(10000) - \frac{\log_4 27}{\log_4 3}$

$4 + \log_3 27 = 7$

$4 - 3 = 1$

1

47. Give the value of the following functions.

a. $\cos(30°)$

$\frac{\sqrt{3}}{2}$

$\frac{\sqrt{3}}{2}$

b. $\sin(30°)$

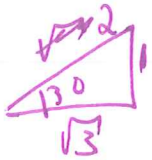
0.5

$\frac{1}{2}$

c. $\tan(30°)$

$\frac{\sqrt{3}}{3}$

$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$



48. Determine if each of the below is geometric, arithmetic, or neither

a. 1,4,9,16,25,36, ...

$1^2, 2^2, 3^2, 4^2$

neither

b. $\frac{1}{2}, \frac{3}{5}, \frac{5}{8}, \frac{7}{11}$ ...

neither

c. $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}, \frac{7}{2}$ ...

Arithmetic

$d = 1$

49. Calculate the sum:

$$\sum_{n=0}^{101} (n - 50) = ?$$

$$\frac{(-50 + 51) \cdot 102}{2} = 51$$

$\frac{(-50+51)}{2} \cdot 102 = 51$

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50. Given the functions

$$f(x) = 2x^2 - 1 \quad \text{and}$$
$$g(x) = x^2 - 3$$

a. Find $f(g(x))$

$2(x^2-3)^2 - 1 = \cdots$

$2(x^2-3)^2-1 = \boxed{2x^4-12x^2+17}$

b. Find $g(f(x))$

$(2x^2-1)^2 - 3 = \cdots$

$(2x^2-1)^2-3 = 4x^4-4x^2+1-3 = \boxed{4x^4-4x^2-2}$

c. Find $g(x) + f(x)$

$2x^2-1+x^2-3 = \boxed{3x^2-4}$

51. Find the inverse of f(x) using Table and algebraic method, and plot both:

$$f(x) = 1 - \sqrt{x-2}$$

Remember to indicate range and domain of each function.

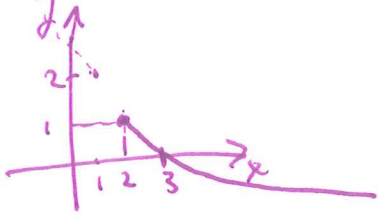
Domain $f(x) = [2, \infty)$

Range $f(x) = (-\infty, 1]$

inverse $\Rightarrow$

inverse: $\boxed{y = (x-1)^2 + 2}$

$x \leq 1$.



52. Find the equation of the line perpendicular to the line

$$y = 5 - 2x$$

and that includes through the point (1,0).

What is the intersection point of these two lines.

$y = 5-2x \Rightarrow m = -2$

$\Downarrow$

$y = \frac{1}{2}x + b \quad \Leftarrow m_{\perp} = \frac{1}{2}$

$(1,0) \Rightarrow y = \frac{1}{2}x - \frac{1}{2}$ ✓

Word problems: See set II

=== End of practice questions (There IS part II: Word problems and miscellaneous).