Name **Answer key**

This test is 100 pts and you have 120 minutes, use your time wisely.
Part 1: 2 pts each, Parts 2 and 3: 3 pts each, Part 4 : 5 points each, Part 5 : 4 pts each
No credit will be given for incorrect answers without shown work.

Part 1: Simplify each expression. Write undefined if necessary. **(No Decimals)**

1. $\sqrt{72}$

ans $6\sqrt{2}$

2. $3\sqrt{20}\cdot 2\sqrt{5}$

ans 60

3. $\dfrac{2\sqrt{3}}{\sqrt{6}}$

ans $\sqrt{2}$

4. $(2-6i)-(-10+4i)$

ans 12-10 i

5. $\left(\dfrac{3}{2^{-2}}\right)\left(\dfrac{1}{2}\right)^2$

ans 3

6. $\dfrac{12xy}{7x^4}\cdot\dfrac{7x^5y^2}{4y^2}$

ans $3x^2y$

7. $\left(2xy^2\right)^3$

ans $8x^3y^6$

8. $\dfrac{\sqrt[3]{x^2}}{x\sqrt{x^3}}$

ans $\dfrac{1}{x^{\frac{11}{6}}}$

9. $\begin{bmatrix} 7 & 3 & -9 \\ 4 & 6 & 2 \end{bmatrix}\begin{bmatrix} 10 & -7 \\ 8 & 1 \end{bmatrix}$

ans not possible

10. $\begin{bmatrix} -4 & 5 & 3 \end{bmatrix}\begin{bmatrix} 3 \\ 7 \\ 2 \end{bmatrix}$

ans [29]

Part 2: Solve for all variables, or state that there is no solution

11. $2x - 5y = 17$
$3x + 4y = 14$

ans (6,-1)

12. $5x = 10y + 20$
$-8y = -4x + 40$

ans no solution, // lines

Solve for x. You may use any valid method.

13. $2x^2 + 9x + 7 = 0$

ans x= -1, -3.5

14. $3(x+4)^2 = -27$

ans x= -4+3i, -4-3i

15. $-9x^2 + 35x - 30 = 1 - x$

ans x = 1.255, 2.745

16. $6x^2 + 15x = 0$

ans x=0 , -2.5

17. $\sqrt[3]{x-1} = 8$

ans x=513

18. $\sqrt{2x+3} = 2$

ans x=1/2

19. $2^{(x+2)} = 4^2$

ans x = 2

20. $\log_5 625 = x$

ans x = 4.0263

21. $\log_2 4^3 = x$ **ans x=6**

Part 3 graphs

State the domain, range and change from the base function for each of the following graphs.

	base function f(x)	Function g(x)	domain	range	change from f(x) to g(x) (shift: ↓ ↑ → ← , flip,stretch)
22.	$f(x)=2^x$	$g(x)=2^{(x+3)}-4$	**Ans** **reals**	**Ans** **y>-4**	**Ans** **Down 4 left 3**
23.	$f(x)=x^2$	$g(x)=-2x^2+1$	**Ans** **reals**	**Ans** **y>1**	**Ans** **Flip over x axis, stretch by 2 up 1**
24.	$f(x)=\sqrt{x}$	$g(x)=-2\sqrt{(x+2)}$	**Ans** **x≥-2**	**Ans** **y<0**	**Ans** **Flip over x axis stretch by 2 left 2**
25.	$f(x)=\sqrt[3]{x}$	$g(x)=\sqrt[3]{x}-1$	**Ans** **reals**	**Ans** **reals**	**Ans** **Down 1**

26. For each function or graph select the **most** descriptive category

Function	Linear	Quadratic	Polynomial	Radical	Exponential	Other
y = (x+2)(x-5)		**X**				
$y=(3x)^{0.5}$				**X**		
2x+y=7	**X**					
			**X**			
					**X**	
						**X**

27. For $f(x) = 2x^2 - 5x - 11$

a. Find the x intercepts.

Ans x = 3.908, -1.408

b. Find $f(-4)$

ans 41

c. Find x when $f(x) = -4$ **ans x= -1, or 3.5**

28. Write and equation in the appropriate form of a parabola with:
x intercepts at x =1 and x = 6 and a point at $(-1,-5)$

ans y=- 5/14 (x-1) (x-6)

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

a. What is the degree and the leading coefficient. **Ans 3rd deg, lead coeff. -4**

b. Describe the end behavior of the function.

f(x) → _____as x → -∞ **Ans pos**

f(x) → _____ as x → +∞ **Ans neg**

Part 4 Applications

30. Two different companies drill water wells for people with country homes. The first charges $500 plus $10 per foot to drill the well. The second charges $1,000 plus $8 per foot to drill the well.

a. For what depth(s) of well would the cost for drilling be the same for both companies?
Ans 250 ft

b. For what depth(s) of well would the cost for drilling by the first company cost less?
Less than 250 ft

c. For what depth(s) of well would the cost for drilling by the second company cost less?
More than 250 ft

31. Read this problem situation:

A restaurant sells sandwiches and individual pizzas for lunch. The people at one table buy 3 sandwiches and 1 pizza, and pay $17.50. The people at another table buy 1 sandwich and 2 pizzas, and pay $12.50. What are the selling prices for sandwiches and pizzas?

a. Identify the two variables that are needed to answer the question.
Make up a letter name for each variable.

S=sand,P= pizza

b. Write two equations that represent the given information.

$17.50 = 3s + p

$12.50 = s + 2p

c. Using a method of your choice, solve the system of equations. Show your steps.

S= $4.50, p = $4.00

d. Write a full sentence that answers the question, "What are the selling prices for sandwiches and pizzas?"

sandwiches cost $4.50, pizza costs $4.00

32. Jack Potts dives off of the high diving board. His distance from the surface of the water varies quadratically with the number of seconds that have passed since he left the board and is represented by the function:

$$y = -5x^2 + 9x + 20$$

When will Jack hit the water?

Ans in 3.093 seconds

Part 5 Other topics

33. Divide: $(x^4 - 16x^2 + x + 4) \div (x + 4)$

ans x^3-4x^2+1

34. Given are $f(x) = x - 1$ and $g(x) = 2x^2$

- ✓ Calculate $f(g(x))$ **ans 2x^2-1**
- ✓ Find the inverse of $f(g(x))$algebraically

Ans Y = $\sqrt{\frac{x-1}{2}}$