Name: _____

1) Express the product of $(\frac{1}{2}y^2 - \frac{1}{3}y)$ and $(12y + \frac{3}{5})$ as a trinomial. [*Show all work.*]

2) Express $\left(\frac{2}{3}x - 1\right)^2$ as a trinomial. [*Show all work.*]

3) Factor the expression $12t^8 - 75t^4$ completely. [*Show all work.*]

4) Factor completely: $10ax^2 - 23ax - 5a$

5) Write the binomial expansion of $(2x - 1)^5$ as a polynomial in simplest form. [*Show all work.*]

6) Express in simplest form: $\dfrac{\frac{1}{2} - \frac{4}{d}}{\frac{1}{d} + \frac{3}{2d}}$

7) Solve for x: $\dfrac{4x}{x-3} = 2 + \dfrac{12}{x-3}$

8) Solve algebraically for x: $\dfrac{1}{x+3} - \dfrac{2}{3-x} = \dfrac{4}{x^2-9}$

9) Express $5\sqrt{3x^3} - 2\sqrt{27x^3}$ in simplest radical form. [*Show all work.*]

10) Express $\dfrac{\sqrt{108x^5y^8}}{\sqrt{6xy^5}}$ in simplest radical form. [*Show all work.*]

11) Express $\dfrac{5}{3-\sqrt{2}}$ with a rational denominator, in simplest radical form. [*Show all work.*]

12) Solve $2x^2 - 12x + 4 = 0$ by completing the square, expressing the result in simplest radical form. [*Show all work.*]

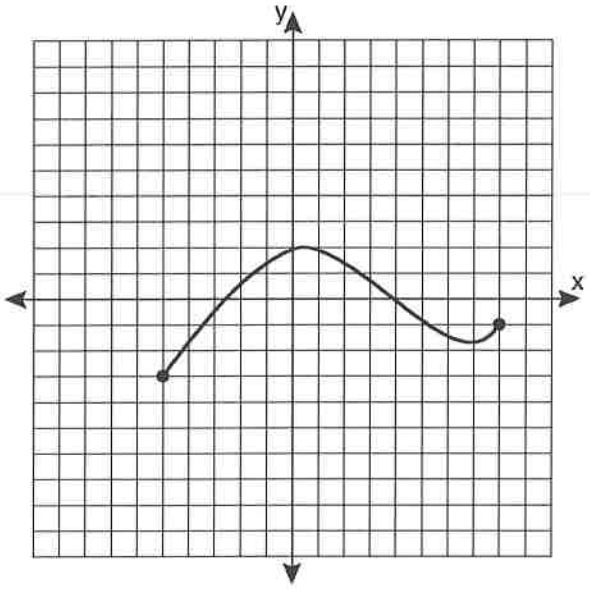
13) Solve the equation $8x^3 + 4x^2 - 18x - 9 = 0$ algebraically for *all* values of x. [*Show all work.*]

14) Write a quadratic equation such that the sum of its roots is 6 and the product of its roots is -27. [*Show all work.*]

15) Find the sum and product of the roots of the equation $5x^2 + 11x - 3 = 0$. [*Show all work.*]

16) Use the discriminant to determine *all* values of k that would result in the equation $x^2 - kx + 4 = 0$ having equal roots. [*Show all work.*]

17) The graph below represents the function $y = f(x)$.



State the domain and range of this function.

18) If $f(x) = x^2 - 6, x \geq 0$, find $f^{-1}(x)$. [*Show all work.*]

19) If $f(x) = x^2 - 6$ and $g(x) = 2^x - 1$, determine the value of $(g \circ f)(-3)$. [*Show all work.*]

20) Solve the following system of equations algebraically:

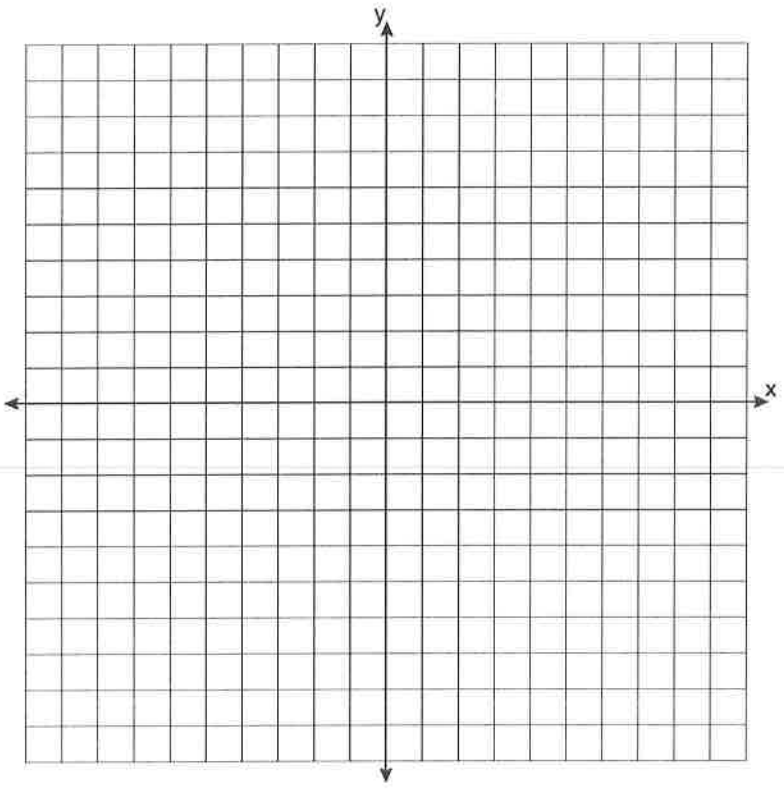
$5 = y - x$

$4x^2 = -17x + y + 4$

21) The graph of the equation $y = \left(\frac{1}{2}\right)^x$ has an asymptote. On the grid below:

(a) Sketch the graph of $y = \left(\frac{1}{2}\right)^x$.

(b) Write the equation of this asymptote.



22) In a study of 82 video game players, the researchers found that the ages of these players were normally distributed, with a mean age of 17 years and a standard deviation of 3 years. Determine if there were 15 video game players in this study over the age of 20. [*Justify your answer.*]

23) The scores of one class on the Unit 2 mathematics test are shown in the table below.

Unit 2 Mathematics Test

Test Score	Frequency
96	1
92	2
84	5
80	3
76	6
72	3
68	2

Find the population standard deviation of these scores, to the nearest tenth. [*Show all work.*]

24) Howard collected fish eggs from a pond behind his house so he could determine whether sunlight had an effect on how many of the eggs hatched. After he collected the eggs, he divided them into two tanks. He put both tanks outside near the pond, and he covered one of the tanks with a box to block out all sunlight.

State whether Howard's investigation was an example of a controlled experiment, an observation, or a survey. [*Justify your response.*]

25) Assume that the ages of first-year college students are normally distributed with a mean of 19 years and standard deviation of 1 year.

(a) To the nearest integer, find the percentage of first-year college students who are between the ages of 18 years and 20 years, inclusive. [*Show all work.*]

(b) To the nearest integer, find the percentage of first-year college students who are 20 years old or older. [*Show all work.*]