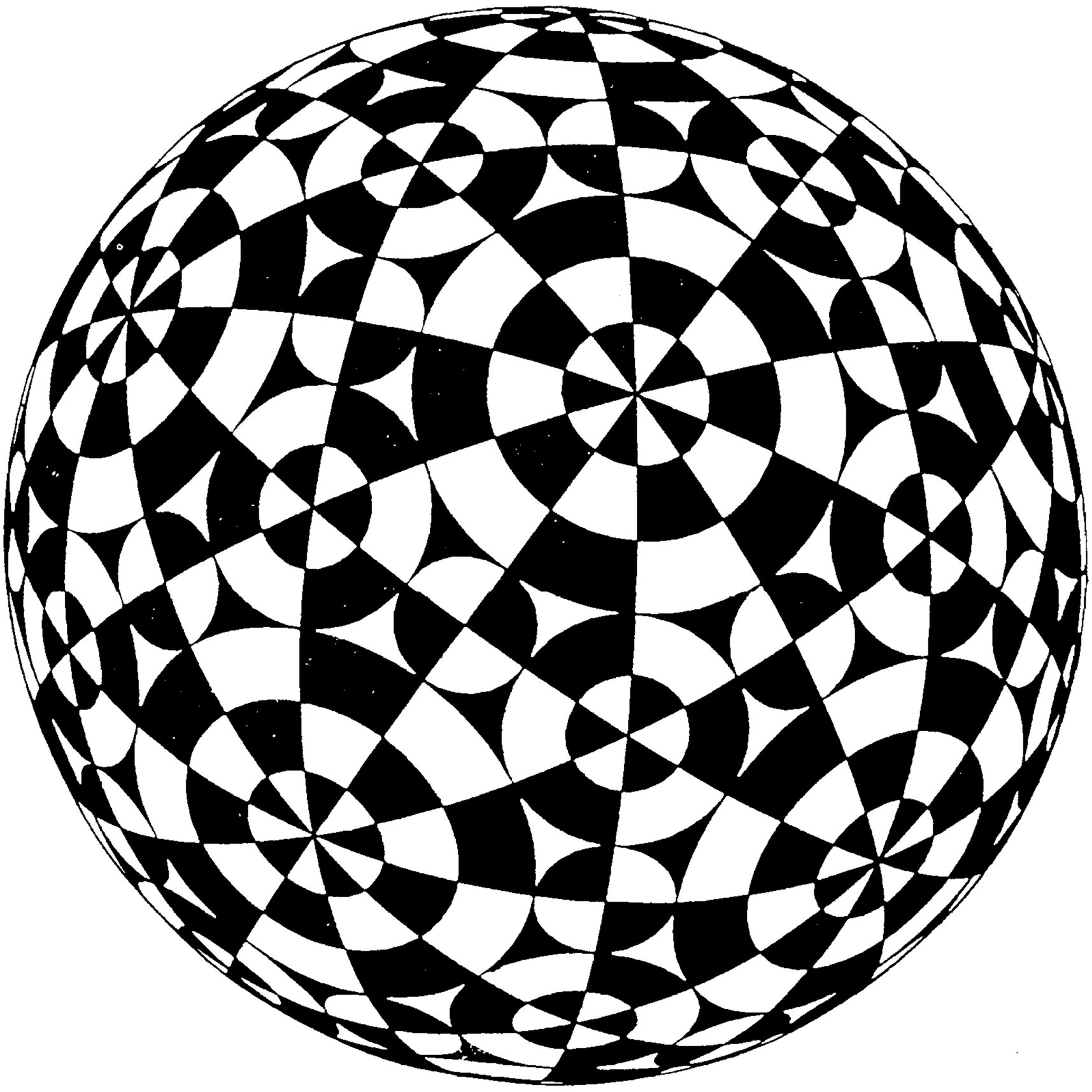
Pre-Calculus Algebra

MTH 1112

Practice Test 4



Practice Test 4

This practice test will cover:

* Synthetic Division
* Zeroes of polynomial functions (including rational zeroes)
* Graphs of polynomial functions
* Introduction to exponential functions
* Introduction to logarithmic functions
* Systems of equations

Synthetic Division:

(1) Use synthetic division to perform the indicated division.

$$\frac{X^2 + 10X + 21}{X + 3} =$$

(2) Use synthetic division to perform the indicated division.

$$\frac{4X^5 - 27X^4 + 20X^3 - 11X^2 - 15X + 54}{X - 6} =$$

(3) Use synthetic division to divide $5X^3 - 6X^2 + 8$ by $X - 4$

(4) Use synthetic division to perform the indicated operation.

$$\frac{P^4 - 1}{P + 4} =$$

(5) Use synthetic division to perform the indicated operation.

$$\frac{X^4 - 10X^2 - 2X + 4}{X + 3} =$$

(6) Use synthetic division to divide $4X^3 - 8X^2 + X + 3$ by $2X - 3$

(7) Express the polynomial in the form $f(X) = (X - k)q(X) + r$ for the given value of $k = -2$.

$$f(X) = 3X^4 - 4X^3 - 2X^2 - 10X + 6$$

(8) For the given polynomial, use the remainder theorem and synthetic division to find $f(k)$.

$k = 2$ $\qquad\qquad$ $f(X) = 4X^4 - 9X^3 + 2X^2 - X + 5$

(9) For the given polynomial, use the remainder theorem and synthetic division to find $f(k)$.

$k = -5$ $\qquad\qquad$ $f(X) = 4X^2 - 9X + 200$

Zeros of Polynomial Functions

(10) Use synthetic division to decide whether the given number is a zero of the given polynomial. *The given number is* -9.

the given polynomial is $f(X) = X^3 + 12X^2 + 34X + 63$

(11) Use the factor theorem to decide whether $(X - 2)$ is a factor of the polynomial $2X^4 + 7X^3 - 4X^2 - 27X - 18$.

(12) Factor $f(X) = X^3 - 2X^2 - 5X + 6$ into linear factors given that 1 is a zero of $f(X)$.

(13) Given that $f(X) = 3X^3 + 38X^2 + 109X + 90$. One zero of $f(X)$ is -9. Find all others.

(14) Find a polynomial of degree 3 with only real coefficients which has zeroes of 2, -3, and 5 and for which $f(3) = -48$.

(15) The polynomial $4X^6 - 10X^5 + 3X^4 - 2X^3 + X^2 - 9X - 7$ has AT MOST how many distinct zeros?

Graphs of Polynomial Functions

(16) Sketch the graph of the polynomial function $f(X) = X^3$

(17) Sketch the graph of the polynomial function $f(X) = X^4$

(18) Sketch the graph of the polynomial function $f(X) = -X^5$

(19) Sketch the graph of the polynomial function $g(X) = X^4 + 1$

(20) Sketch the graph of the polynomial function $h(X) = (X + 1)^4$

(21) Sketch the graph of the polynomial $f(X) = -X^3 + 4X$

(22) Sketch the graph of the polynomial $f(X) = X^4 - 5X^2 + 4$

(23) Sketch the graph of the polynomial $f(X) = X^5 - X$

(24) Sketch the graph of the polynomial $f(X) = X^3 - X^2 - 2X$

(25) Sketch the graph of the the polynomial $f(X) = -2X^4 + 2X^2$

Exponential Functions

(26) Sketch the graph of $f(X) = 2^X$
What is the domain? What is the range?

(27) Sketch the graph of $F(X) = 2^{-X}$

(28) Sketch the graph of $f(X) = -2^X$

(29) Sketch the graph of $g(X) = 3^{X+1}$

(30) Sketch the graph of $h(X) = 3^X - 2$

Logarithmic Functions

(31) What is the value of e ? Round your answer to three decimal places.

(32) Given $3^X = \frac{1}{27}$. Give the exact solution.

(33) Given $9^X = 27$. Give the exact solution.

(34) Given $64^X = 16$. Give the exact solution.

(35) Given $27^{X-1} = 81^{2X+1}$. Give the exact solution.

(36) Given $\frac{1}{81} = K^{-4}$. Give the exact solution.

(37) Solve for r.

$$4 = r^{\frac{2}{3}}$$

(38) $M = \log_K T$ if and only if _____.

(39) Write $8 = 2^3$ in logarithmic form.

(40) Write $\left(\frac{1}{2}\right)^{-4} = 16$ in logarithmic form.

(41) Write $\log_3\left(\frac{1}{81}\right) = -4$ in exponential form.

(42) Complete. $\log_2 \frac{1}{4} =$ ____

(43) Complete. $\log_4 2 =$ ____

(44) Complete. $\log_2 32 =$ ____

(45) Solve for X. $\log_X \frac{27}{125} = 3$

(46) Solve for X. $\log_X 81 = 4$

(47) Solve for X. $\log_9 X = 3$

(48) Solve for X. $\log_{16} X = \frac{3}{4}$

(49) Write each expression as the sum, difference, or product of logarithms. Simplify. Assume all variables represent positive real numbers.

$$\log_2\left(\frac{5m}{n}\right)$$

(50) Write each expression as a sum, difference, or product of logarithms. Simplify. Assume all variables represent positive real numbers.

$$\log_m \sqrt[4]{\frac{X^2Y^4}{Z^5}}$$

(51) Solve.

$$\log_a(X+4) = \log_a 6$$

(52) Solve.

$$\ln(5+4Y) - \ln(3+Y) = \ln 3$$

(53) Solve.

$$\ln e^X - \ln e^3 = \ln e^5$$

Systems of Equations

(54) Solve the system of equations shown below.

$$2X + Y = 5$$

$$3X - 2Y = 4$$

(55) Solve the system of equations shown below.

$$X + Y = 4$$

$$X - Y = 2$$

(56) Solve the system of equations shown below.

$$2X - Y + 2 = 0$$

$$4X + Y - 5 = 0$$

(57) Solve the system of equations shown below.

$$X + 2Y = 1$$

$$5X - 4Y = -23$$

(58) Solve the system of equations shown below.

$$X - Y + Z = 4$$

$$X + 3Y - 2Z = -3$$

$$3X + 2Y + Z = 5$$

(59) Solve the system of equations shown below.

$$X + Y + Z = 6$$

$$2X - Y + Z = 3$$

$$3X - Z = 0$$

(60) Solve the system of equations shown below.

$$\frac{X}{2} + \frac{Y}{3} = 8$$

$$\frac{2X}{3} + \frac{3Y}{2} = 17$$

Answers:

(1) $X + 7$

(2) $4X^4 - 3X^3 + 2X^2 + X - 9$

(3) $5X^2 + 14X + 56 + \frac{232}{X-4}$

(4) $P^3 - 4P^2 + 16P - 64 + \frac{255}{P+4}$

(5) $X^3 - 3X^2 - X + 1 + \frac{1}{X+3}$

(6) Synthetic division cannot be used in this case. Remember synthetic division can only be used when the polynomial you are dividing by is a binomial (has two terms) of the first degree (the exponent on the variable is 1) and the coefficient of the variable is 1. In this case, the coefficient of the variable is not 1 and so synthetic division cannot be used.

(7) $(X+2)(3X^3-10X^2+18X-46)+98$

(8) $f(2)=3$

(9) $f(-5)=345$

(10) Yes, -9 is a factor because when you synthetically divide you get a remainder of zero.

(11) Yes $(X-2)$ is a factor because when you synthetically divide by 2 you get a remainder of zero.

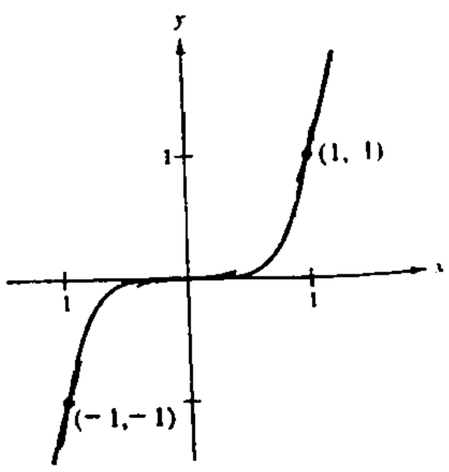
(12) $(X-1)(X+2)(X-3)$

(13) The other zeros are -2 and $-\frac{5}{3}$.

(14) $f(X)=4X^3-16X^2-44X+120$

(15) 6

(16)



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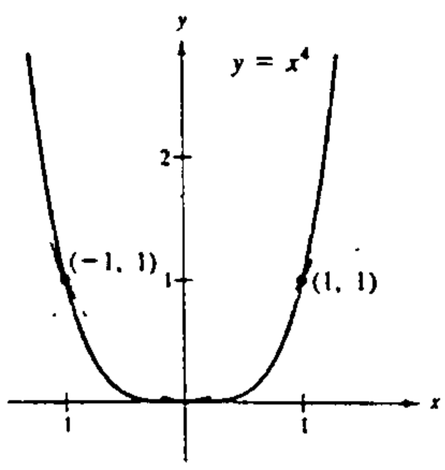

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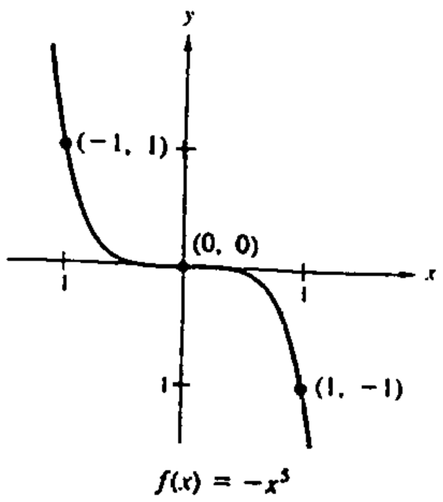

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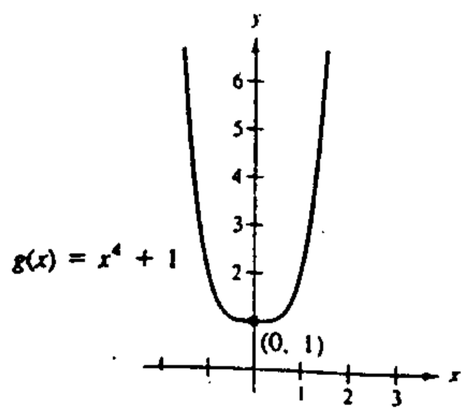

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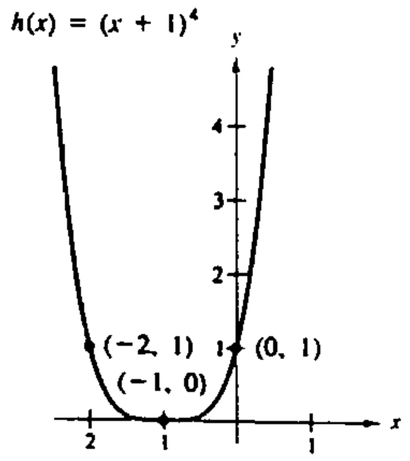

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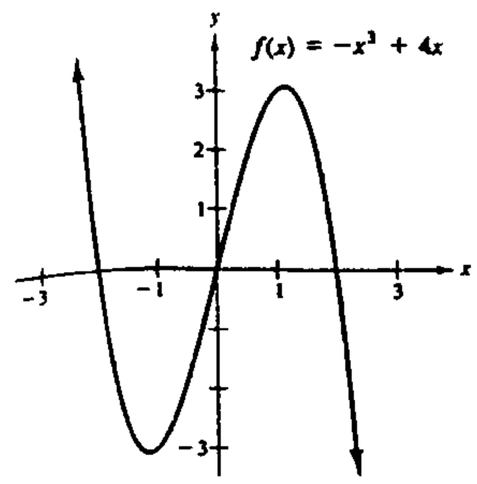

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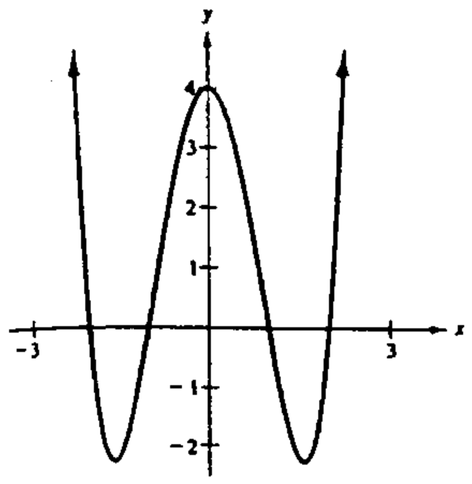

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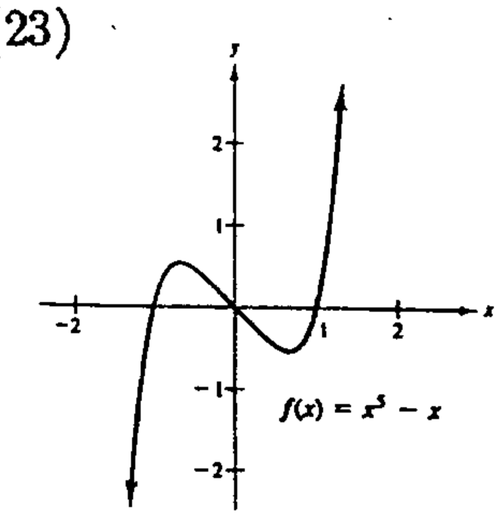

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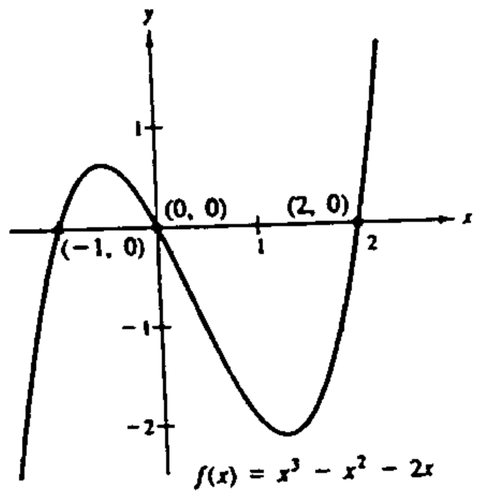

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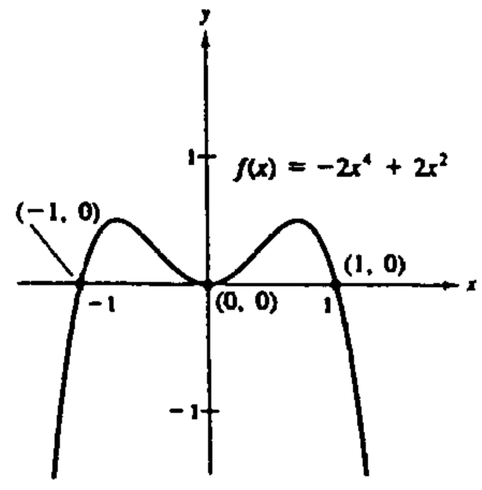
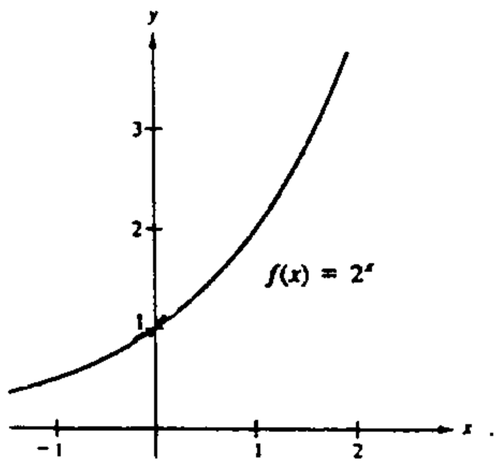
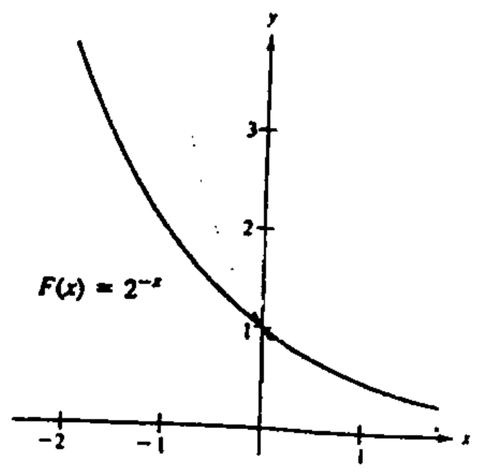


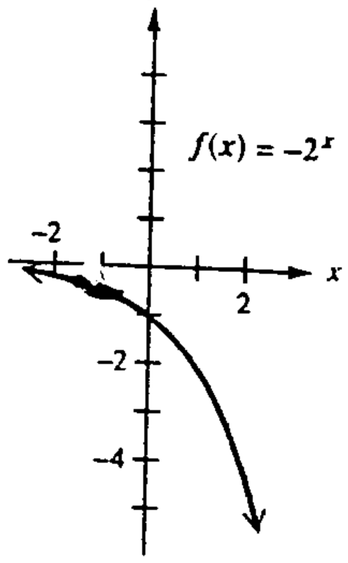
(26) Domain is $(-\infty, \infty)$
Range is $(0, \infty)$



(27) Domain is $(-\infty, \infty)$
Range is $(0, \infty)$



(28) Domain is $(-\infty, \infty)$
Range is $(-\infty, 0)$



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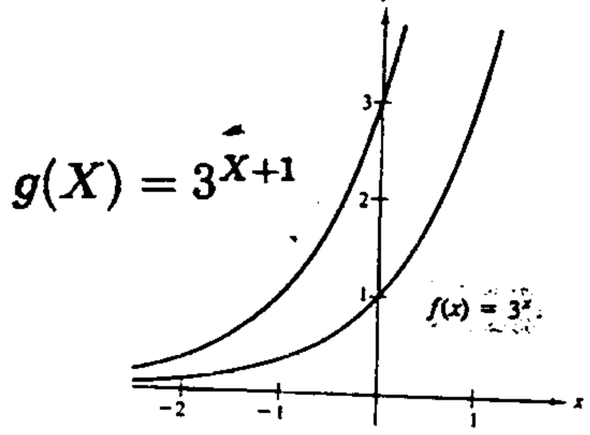

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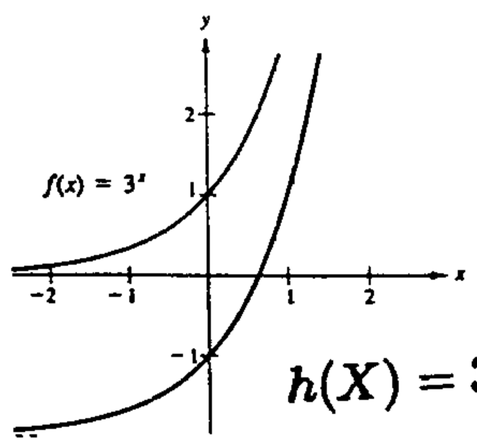

(31) 2.718

(32) $\{-3\}$

(33) $\{\frac{3}{2}\}$

(34) $\{\frac{2}{3}\}$

(35) $\left\{-\frac{7}{5}\right\}$

(36) $\{-3, 3\}$

(37) $\{8, -8\}$

(38) $K^M = T$

(39) $\text{Log}_2 8 = 3$

(40) $\text{Log}_{\frac{1}{2}} 16 = -4$

(41) $3^{-4} = \frac{1}{81}$

(42) $\{-2\}$

(43) $\left\{\frac{1}{2}\right\}$

(44) $\{5\}$

(45) $\left\{\frac{3}{5}\right\}$

(46) $\{3\}$

(47) $\{729\}$

(48) $\{8\}$

(49) $\log_2 5 + \log_2 m - \log_2 n$

(50) $\frac{1}{4}(2\log_m X + 4\log_m Y - 5\log_m Z)$

(51) $\{2\}$

(52) $\{4\}$

(53) $\{8\}$

(54) $(2, 1)$

(55) $(3, 1)$

(56) $\left(\frac{1}{2}, 3\right)$

(57) $(-3, 2)$

(58) $(2, -1, 1)$

(59) $(1, 2, 3)$

(60) $(12, 6)$