

# AK

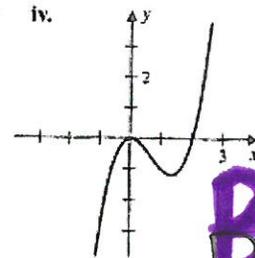
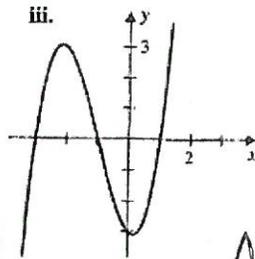
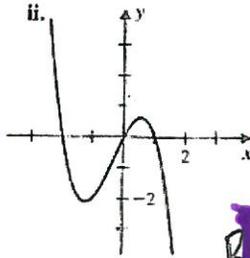
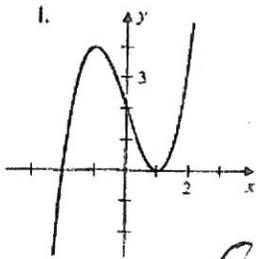
Name: \_\_\_\_\_

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## Chapter 3 Polynomials Review

1. Match the equation with the graph.

a.  $y = (x-1)(x+1)(x+3)$     b.  $y = x^2(x-2)$     c.  $y = (x+2)(x-1)^2$     d.  $y = x(x+2)(1-x)$



C

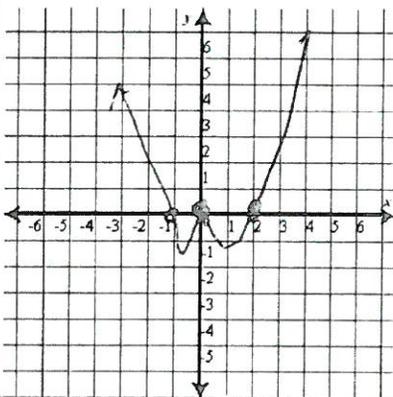
D

A

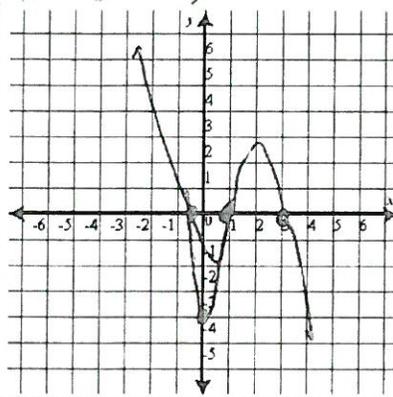
B

Sketch a graph of  $f(x)$  without using a calculator.

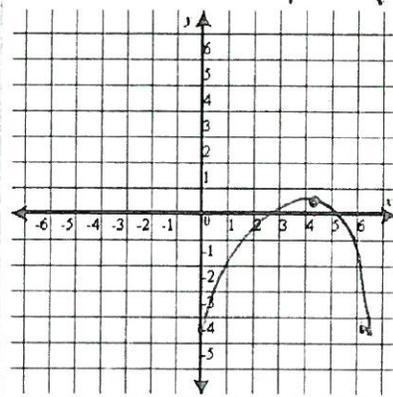
2.  $f(x) = x^4 - x^3 - 2x^2$   
 $x^2(x^2 - x - 2)$   
 $x^2(x-2)(x+1)$



3.  $f(x) = -4x^3 + 15x^2 - 8x - 3$   
 $-1(x-1)(4x+1)(x-3)$



4.  $f(x) = -\frac{1}{3}x^2 + 3x - 6$      $x = \frac{-3}{2(-\frac{1}{3})} = \frac{9}{2}$   
 $-\frac{1}{3}(x - \frac{9}{2}) + \frac{3}{4}$      $f(\frac{9}{2}) = -\frac{1}{3}(\frac{9}{2})^2 + 3(\frac{9}{2}) - 6$



$f(\frac{9}{2}) = -\frac{1}{3}(\frac{9}{2})^2 + 3(\frac{9}{2}) - 6$   
 $= -\frac{81}{12} + \frac{27}{2} - 6$   
 $= -\frac{81}{12} + \frac{108}{12} - \frac{72}{12}$   
 $= \frac{55}{12}$

5. Find the dimensions of a triangle with maximum area where the sum of the base and height is 24. No Calc.

$$A(x) = \frac{1}{2}b(24-b) = -\frac{1}{2}b^2 + 12b$$

$$x = \frac{-12}{2(-\frac{1}{2})} = 12$$

$$b = 12, h = 12$$

6. Given  $f(x) = 3x^3 + 4x - 7$ , express  $f(x)$  in the form  $f(x) = q(x)(x^2 + 1) + r(x)$ .

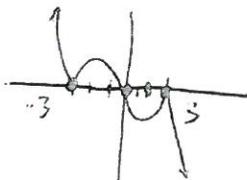
$$x^2 + 1 \overline{) 3x^3 + 4x - 7}$$

$$\underline{-3x^3 + 3x} \phantom{-7}$$

$$x - 7$$

$$f(x) = 3x(x^2 + 1) + x - 7$$

7. Write a polynomial of least degree with a bounce at  $x = -3$ , a zero at the origin, is an odd function and has a negative leading coefficient in factored form.



$$f(x) = -1(x+3)^2(x-3)^2x$$

8. Write the function  $g(x)$  in standard (vertex) form.  $g(x) = -2x^2 + 6x + 7$

$$x = \frac{-b}{2a} = \frac{6}{2(-2)} = \frac{3}{-2}$$

$$g(x) = -2\left(x - \frac{3}{2}\right)^2 + \frac{23}{2}$$

$$g\left(\frac{3}{2}\right) = -2\left(\frac{9}{4}\right) + 6\left(\frac{3}{2}\right) + 7 = -\frac{18}{4} + \frac{36}{4} + \frac{28}{4} = \frac{46}{4} = \frac{23}{2}$$

9. Let  $v(x) = 6x^3 + 41x^2 - 9x - 14$  represents the volume of a rectangular prism. If  $h(x) = 2x + 1$  represents the height, find  $a(x)$ , the area of the base of the rectangular prism.

~~$$\begin{array}{r} 2x+1 \overline{) 6x^3 + 41x^2 - 9x - 14} \\ \underline{4x^2 + 6x} \phantom{-14} \\ 3x^2 - 4x - 14 \\ \underline{3x^2 + 3x} \phantom{-14} \\ -7x - 14 \\ \underline{-7x - 7} \\ -7 \end{array}$$~~

~~$$\begin{array}{r} 2x+1 \overline{) 6x^3 + 41x^2 - 9x - 14} \\ \underline{4x^2 + 6x} \phantom{-14} \\ 3x^2 - 4x - 14 \\ \underline{3x^2 + 3x} \phantom{-14} \\ -7x - 14 \\ \underline{-7x - 7} \\ -7 \end{array}$$~~

$$\begin{array}{r} 2x+1 \overline{) 6x^3 + 41x^2 - 9x - 14} \\ \underline{4x^2 + 6x} \phantom{-14} \\ 3x^2 - 4x - 14 \\ \underline{3x^2 + 3x} \phantom{-14} \\ -7x - 14 \\ \underline{-7x - 7} \\ -7 \end{array}$$

10. What value of  $c$  would make  $(x + 2)$  a factor of  $p(x) = 5x^3 + cx + 8$ ?

$$\begin{array}{r} -2 \overline{) 5 \ 0 \ c \ 8} \\ \underline{-10 \ 20 \ -40 \ -2c} \\ 5 \ -10 \ 20+c \ \underline{-32-2c} \end{array}$$

$$\frac{-32-2c}{2} = \frac{2c}{2}$$

$$-16 = c$$

11. Given  $a(x) = 3x^3 - 2x^2 + 15x - 10$ .

a) List all possible rational zeros.

$$\pm 1, 2, 5, 10, \frac{1}{3}, \frac{2}{3}, \frac{5}{3}, \frac{10}{3}$$

b) Find all zeros of  $a(x)$ .

$$\begin{array}{r} 2/3 \overline{) 3 \ -2 \ 15 \ -10} \\ \underline{2 \ 0 \ 10} \\ 3 \ 0 \ 15 \ 0 \end{array}$$

$$(x - \frac{2}{3})(3x^2 + 15)$$

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

$$3(x - \frac{2}{3})(x + \sqrt{5}i)(x - \sqrt{5}i)$$

c) Verify your results with Descartes' rule of signs.

$a(x) \rightarrow 3$  sign changes, 3 or 1 pos real zeros

$a(-x) = -3x^3 - 2x^2 - 15x - 10 \rightarrow$  No sign changes, No neg. real zeros

d) Factor  $a(x)$ .

e) Sketch a graph of  $a(x)$

e) Write the end behavior of  $a(x)$ .

$$x \rightarrow \infty, f(x) \rightarrow \infty$$

$$x \rightarrow -\infty, f(x) \rightarrow -\infty$$

f) Find the y-intercept of  $a(x)$ .

$$(0, -10)$$

