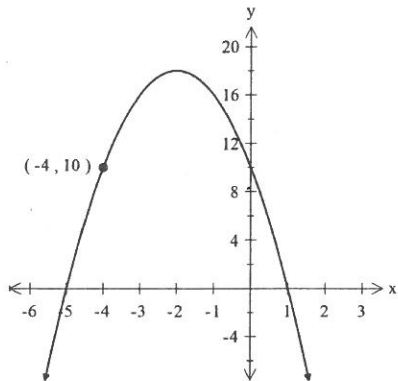


# 40S Pre-Calculus

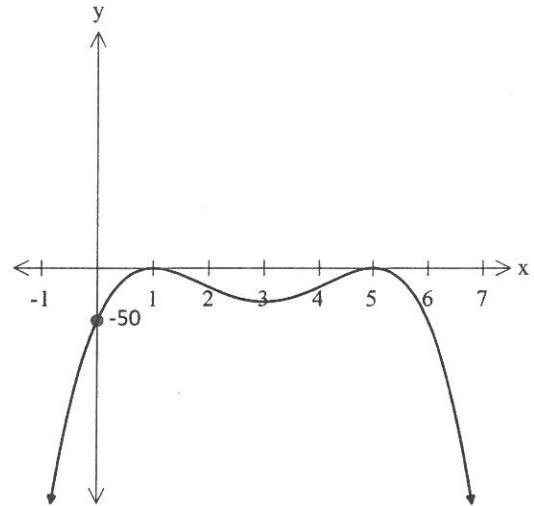
## More Practice with Polynomial Functions

Determine possible equations for the following graphs of the polynomial functions shown below. Leave your equations in factored form

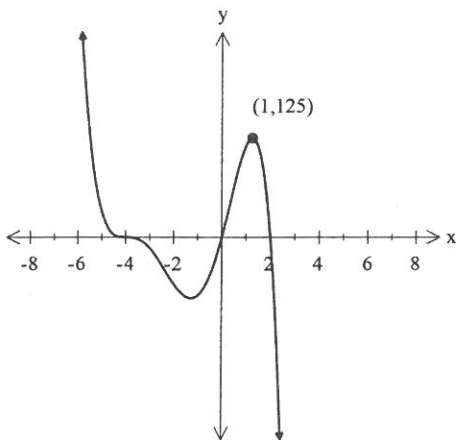
a)



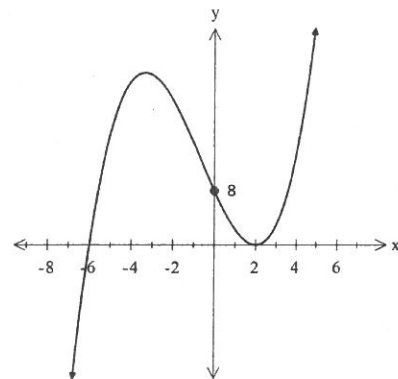
b)



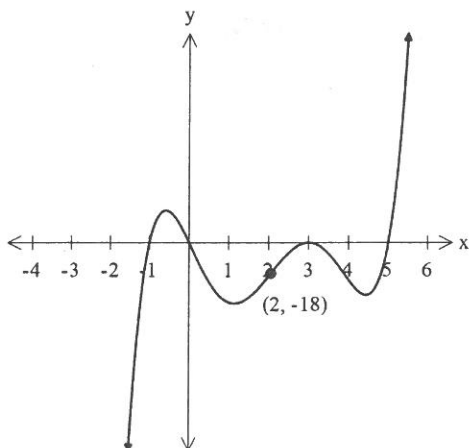
c)



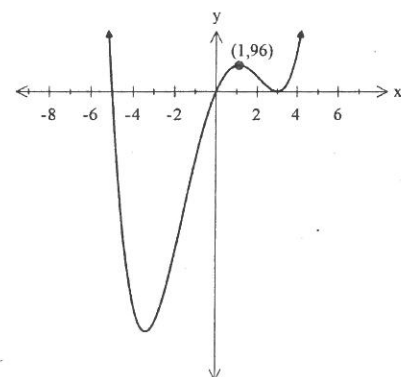
d)



e)



f)



a) → Quadratic

→ lead coeff is negative

→ y-int at 10

→ x intercepts at 1 and -5. (multiplicity 1)

→ maximum at (-2, 18)

→ given point (-4, 10)

$$x = 1 \quad x = -5$$

$$f(x) = a(x-1)(x+5)$$

$$10 = a(-4-1)(-4+5)$$

$$10 = a(-5)(1)$$

$$\frac{10}{-5} = \frac{-5a}{-5}$$

$$-2 = a$$

Therefore,  $f(x) = -2(x-1)(x+5)$

b) Quartic Degree 4 ✓

Neg lead coeff.

y-int at  $-50 \leftarrow (0, -50)$

x-int at 1 and 5  
↑ multiplicity 2      ↑ multiplicity 2

$$f(x) = a(x-1)^2(x-5)^2$$

$$-50 = a(0-1)^2(0-5)^2$$

$$-50 = a(1)(25)$$

$$\frac{-50}{25} = \frac{25a}{25}$$

$$-2 = a$$

$$f(x) = -2(x-1)^2(x-5)^2$$

c) Odd degree.

Quintic

x-int

-4

0

2

← multip. 3

← multip. 1

← multip. 1

y-int = 0

point (1, 125)

leading coeff is Neg

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

$$125 = a(1+4)^3(1)(1-2)$$

$$125 = a(5)^3(1)(-1)$$

$$125 = a(-125)$$

$$\frac{125}{-125} = \frac{a(-125)}{-125}$$

$$a = -1$$

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

d) lead coeff +ve Deg 3 cubic.

$$y\text{-int} = 8 \quad (0, 8)$$

$$x\text{-int} = \begin{array}{cc} 2 & -6 \\ \uparrow & \uparrow \\ \text{multiplicity} & \text{multiplicity} \\ \text{of } 2 & \end{array}$$

$$f(x) = a(x-2)^2(x+6)$$

$$8 = a(0-2)^2(0+6)$$

$$8 = a(-2)^2(6)$$

$$8 = a(4)(6)$$

$$8 = a(24)$$

$$a = \frac{8}{24}$$

$$a = \frac{1}{3} \quad f(x) = \frac{1}{3}(x-2)^2(x+6)$$

e) Odd degree

+ve lead coeff.

Quintic

$x$ -int    -1, 0, 3, 5  
          ↑    ↑    ↑    ↑  
          multip. multip. multip. multip.  
          1    1    2    1

$$f(x) = a(x+1)(x)(x-3)^2(x-5)$$

$$-18 = a(2+1)(2)(2-3)^2(2-5)$$

$$-18 = a(3)(2)(1)(-3)$$

$$\frac{-18}{-18} = \frac{-18a}{-18}$$

$$a = 1$$

$$f(x) = (x+1)(x)(x-3)^2(x-5)$$

f) even function. Deg 4 Quartic.

+ive lead coeff.

x-int    -5, 0, 3  
          ↑     ↑     ↑  
          multip   multip   multip  
          1       1       2

pt. (1, 96)

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

$$96 = a(1+5)(1)(1-3)^2$$

$$96 = a(6)(1)(4)$$

$$96 = a(24)$$

$$\frac{96}{24} = \frac{a(24)}{24}$$

$$4 = a$$

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