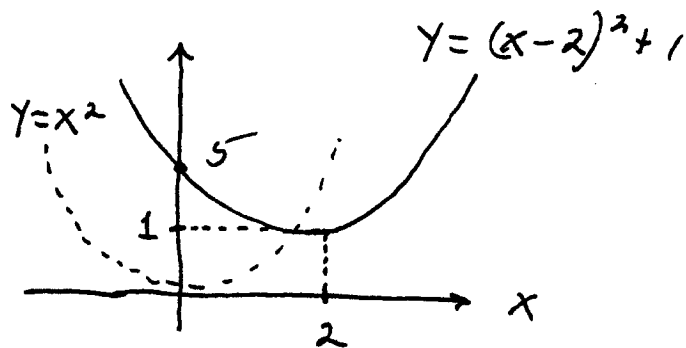
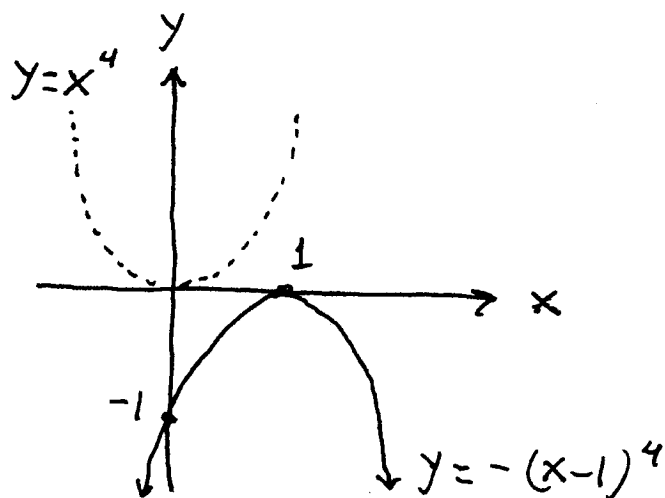


Section 4.6

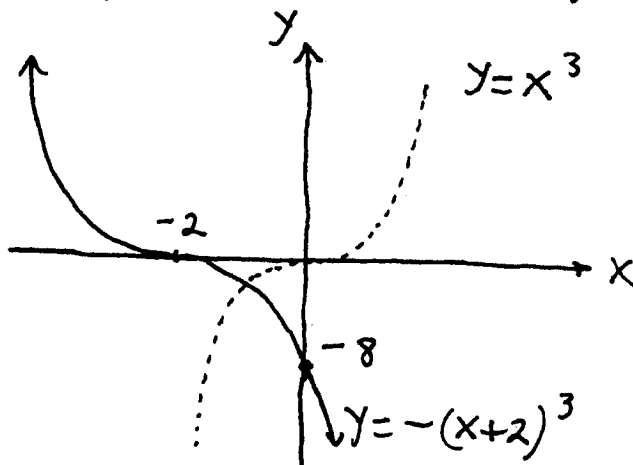
5) $y = (x-2)^2 + 1$:
 translate $y = x^2$
 right 2 and up 1 ;
 $y=0$: impossible ,
 $x=0$: $y = (-2)^2 + 1 = 5$



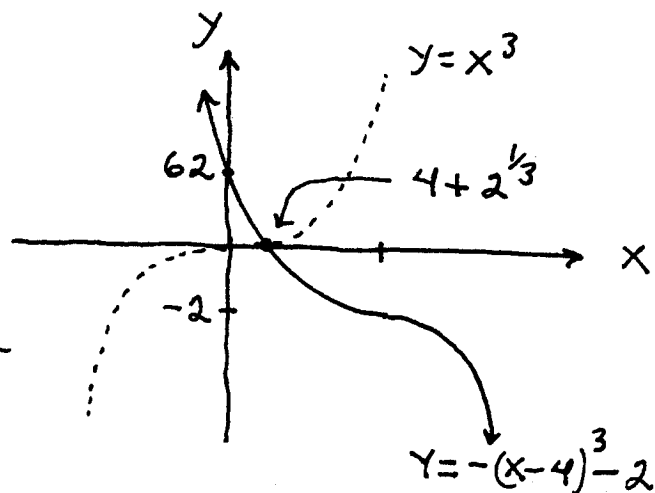
7) $y = -(x-1)^4$:
 translate $y = x^4$
 right 1 and reflect
 in the x-axis ;
 $y=0$: $-(x-1)^4 = 0 \rightarrow x=1$,
 $x=0$: $y = -(-1)^4 = -1$



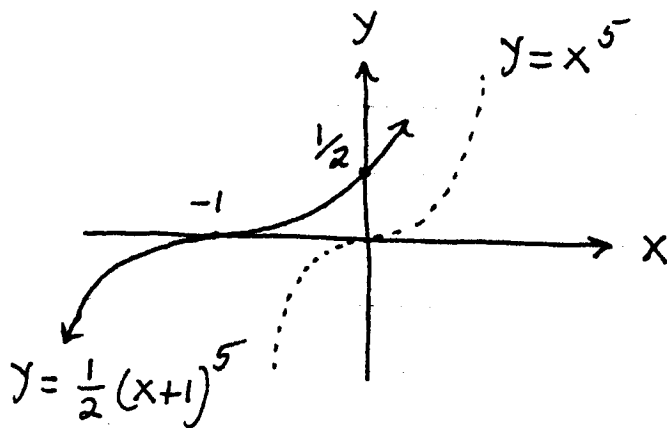
8) $y = -(x+2)^3$:
 translate $y = x^3$
 left 2 and reflect
 in the x-axis ;
 $y=0$: $-(x+2)^3 = 0 \rightarrow x=-2$,
 $x=0$: $y = -(2)^3 = -8$



10) $y = -(x-4)^3 - 2$:
 translate $y = x^3$ right
 4, reflect in the x-axis,
 translate down 2 ;
 $y=0$: $-(x-4)^3 - 2 = 0 \rightarrow (x-4)^3 = -2$
 $\rightarrow x-4 = -2^{1/3} \rightarrow x = 4 - 2^{1/3}$
 $x=0$: $y = -(-4)^3 - 2 = 62$



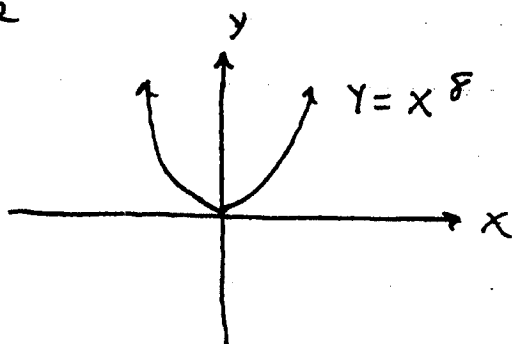
13) $y = \frac{1}{2}(x+1)^5$:
 translate $y = x^5$
 left -1, then
 "flatten" by $\frac{1}{2}$;
 $y=0: \frac{1}{2}(x+1)^5 = 0 \rightarrow x = -1$,
 $x=0: y = \frac{1}{2}(1)^5 = \frac{1}{2}$



16)

$$x=0: y=0$$

$$y=0: x=0$$



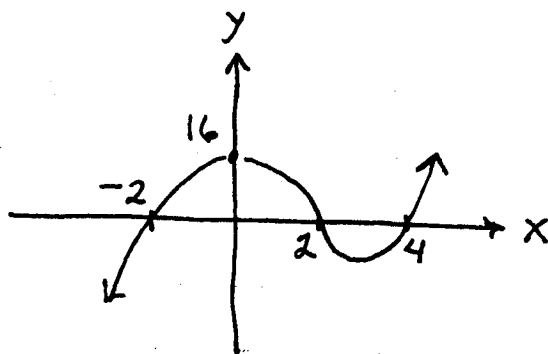
30)

$$y = (x-4)(x-2)(x+2)$$

$\uparrow \quad \quad \uparrow \quad \quad \uparrow$
 cross cross cross

$$x=0: y = (-4)(-2)(2) = 16,$$

$$y=0: x=4, x=2, x=-2$$



31)

$$y = x^3 - 4x^2 - 5x$$

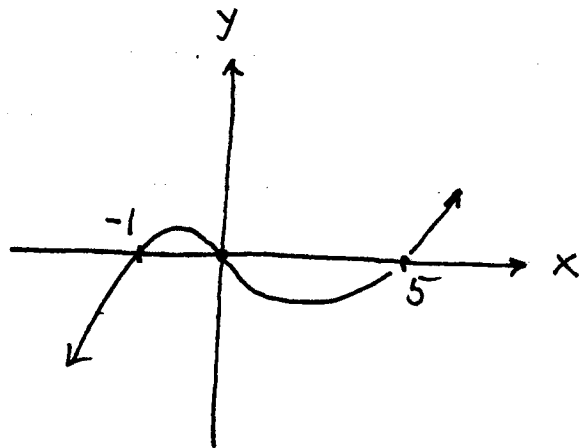
$$= x(x^2 - 4x - 5)$$

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

$\uparrow \quad \quad \uparrow \quad \quad \uparrow$
 cross cross cross

$$x=0: y=0,$$

$$y=0: x=0, x=5, x=-1$$



32)

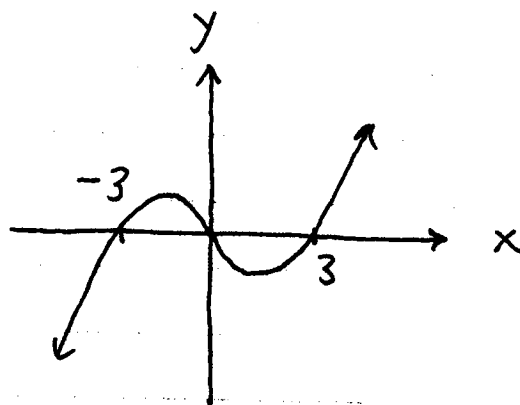
$$y = x^3 - 9x$$

$$= x(x^2 - 9) = x(x-3)(x+3)$$

$\uparrow \quad \uparrow \quad \uparrow$
 cross cross cross

$$x=0: y=0,$$

$$y=0: x=0, x=3, x=-3$$



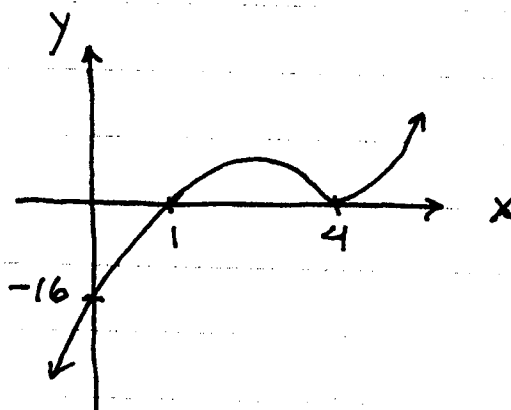
36)

$$y = (x-1)(x-4)^2$$

$\uparrow \quad \uparrow$
 cross touch

$$x=0: y = (-1)(-4)^2 = -16,$$

$$y=0: x=1, x=4$$



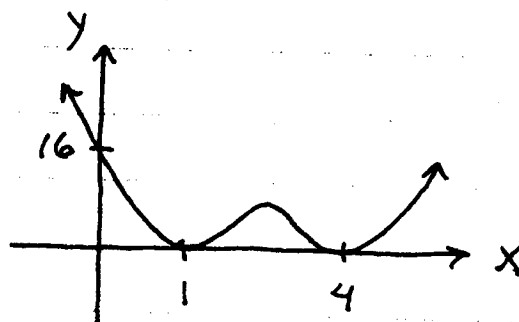
38)

$$y = (x-1)^2(x-4)^2$$

$\uparrow \quad \uparrow$
 touch touch

$$x=0: y = (-1)^2(-4)^2 = 16,$$

$$y=0: x=1, x=4$$



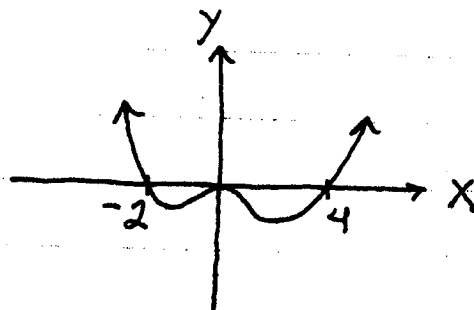
40)

$$y = x^2(x-4)(x+2)$$

$\uparrow \quad \uparrow \quad \uparrow$
 touch cross cross

$$x=0: y=0,$$

$$y=0: x=0, x=4, x=-2$$



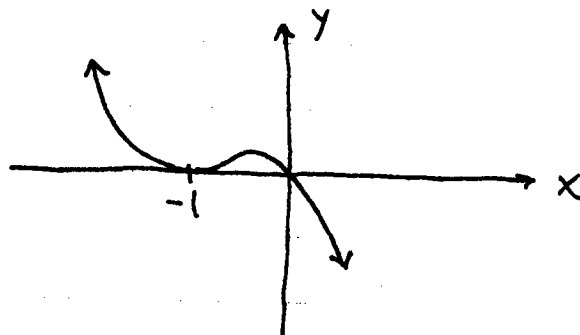
44)

$$y = -3x^3(x+1)^4$$

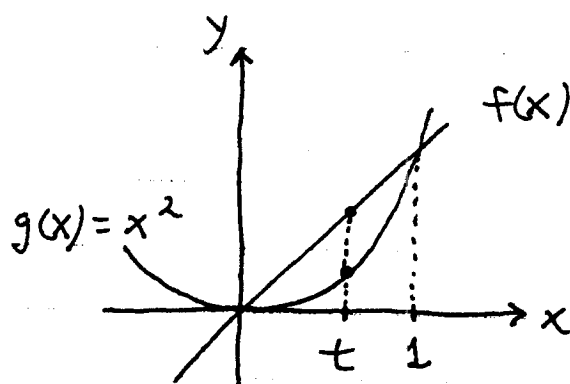
$\uparrow \quad \uparrow$
 cross touch

$$x=0: y=0,$$

$$y=0: x=0, x=-1$$



56)



$$f(x) = x$$

$$f(t) - g(t) = \frac{1}{4} \rightarrow$$

$$t - t^2 = \frac{1}{4} \rightarrow$$

$$0 = t^2 - t + \frac{1}{4} \rightarrow$$

$$0 = 4t^2 - 4t + 1 \rightarrow$$

(quadratic formula)

$$t = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(4)(1)}}{2(4)} = \frac{4 \pm 0}{8} = \frac{1}{2}$$

58)

$$F(t) = G(t) + H(t) \rightarrow t^4 = t^5 + t^6 \rightarrow$$

$$t^6 + t^5 - t^4 = 0 \rightarrow t^4(t^2 + t - 1) = 0 \rightarrow t = 0 \text{ and}$$

$$t = \frac{-1 \pm \sqrt{1^2 - 4(1)(-1)}}{2(1)} = \frac{-1 \pm \sqrt{5}}{2} = \frac{-1 + \sqrt{5}}{2} \text{ or } \frac{-1 - \sqrt{5}}{2}$$

$$\rightarrow t = \frac{-1 + \sqrt{5}}{2} \approx 0.618$$