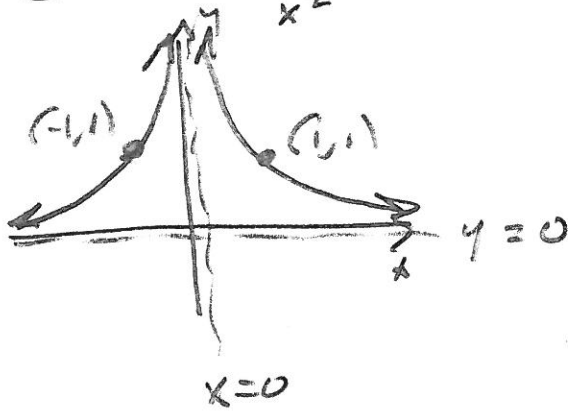
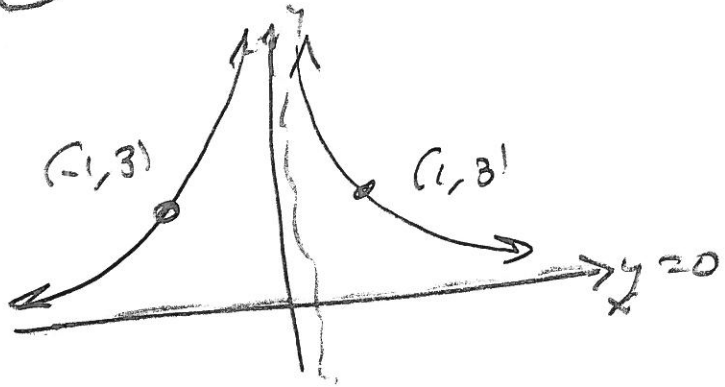


① $g(x) = \frac{3}{(5x-15)^2} - 6$ $g(0) = \frac{3}{15^2} - 6 < 0$

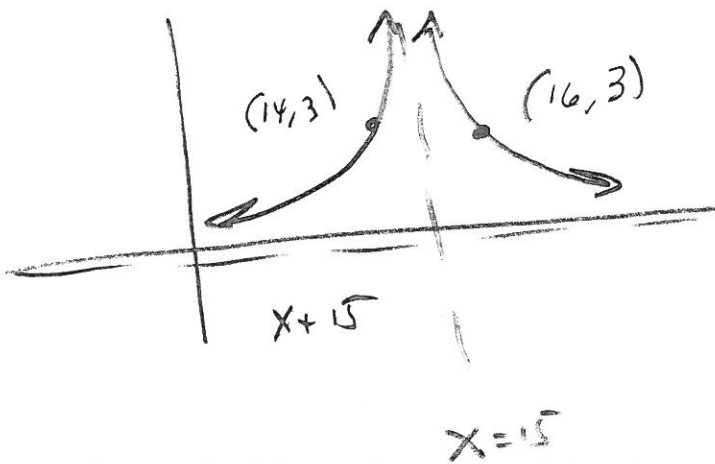
② $f(x) = \frac{1}{x^2}$



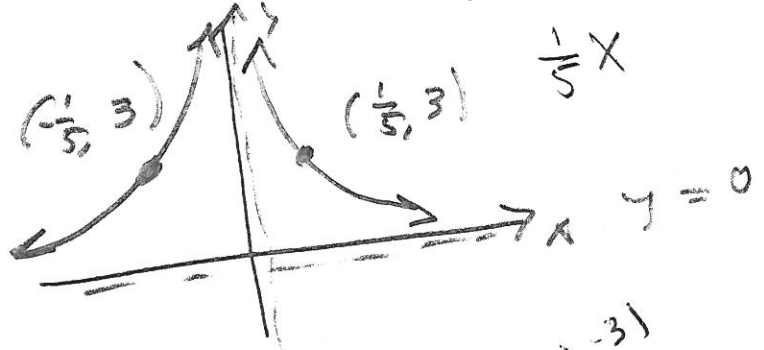
① $3f(x) = \frac{3}{x^2}$



② (M1) $3f(x-15) = \frac{3}{(x-15)^2}$

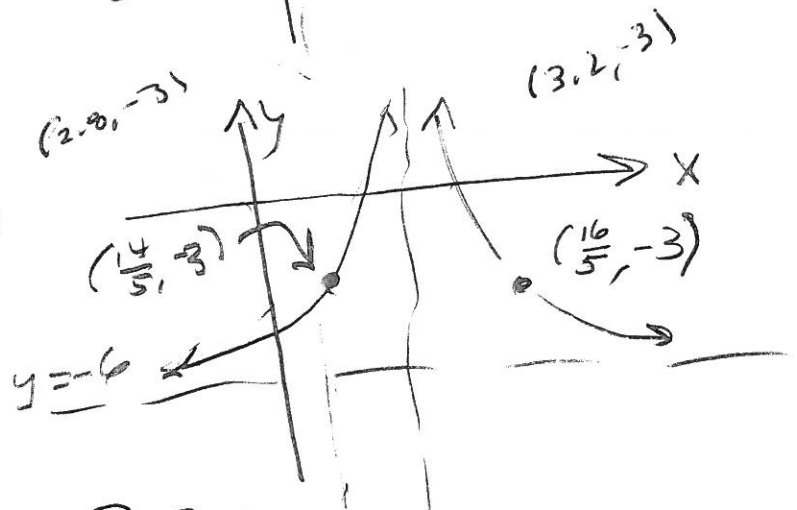
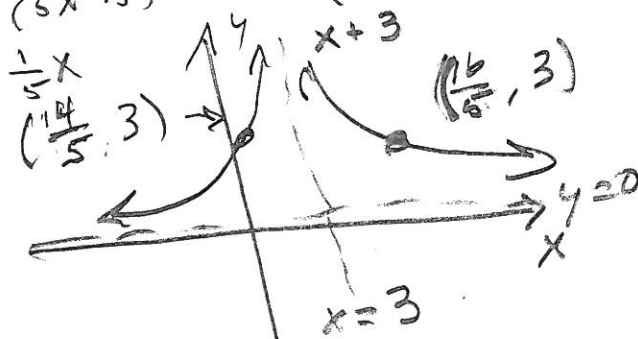


② (M2) $5x-15 = 5(x-3)$
 $3f(5x) = \frac{3}{(5x)^2}$



③ $3f(5x-15) = 3f(5(x-3))$

$= \frac{3}{(5x-15)^2} = \frac{3}{(5(x-3))^2}$



(M1) ③ $\frac{x}{5}$
 (M2) ③ $x+3$

$x=3$

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WIP ~~2~~

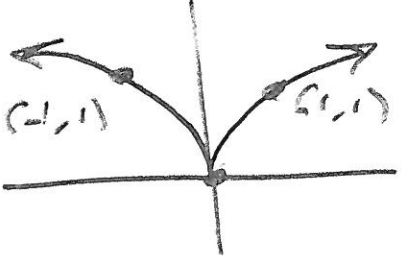
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(2) $g(x) = 5(2x-14)^{2/3} + 4$

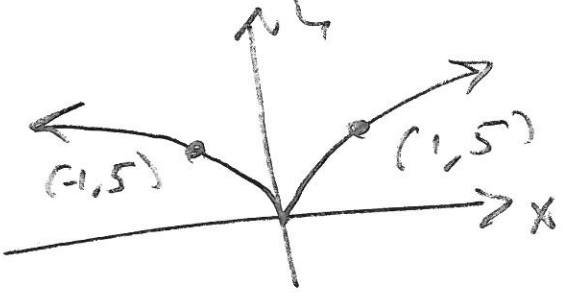
$g(0) = 5(-14/1)^{2/3} + 4 > 0$

(To see where axes are in final graph.)

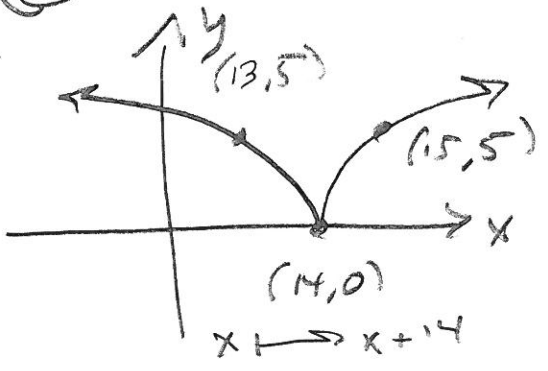
(0) $f(x) = x^{2/3}$



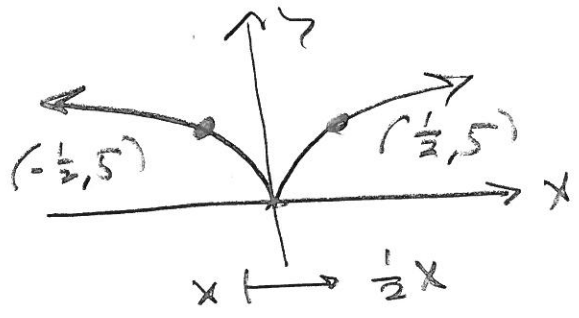
(1) $5f(x) = 5x^{2/3}$



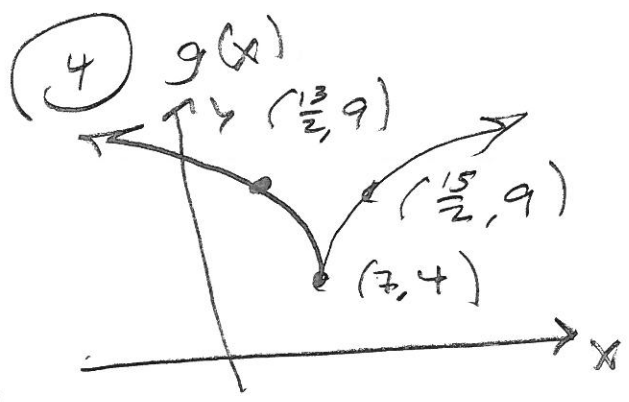
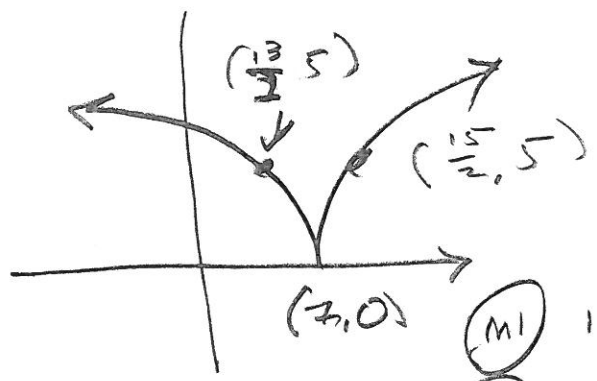
(2) M1 $5f(x-14) = 5(x-14)^{2/3}$



M2 $2x-14 = 2(x-7)$
(2) $5f(2x) = 5(2x)^{2/3}$



(3) M1 $x \mapsto \frac{1}{2}x$ $5(2x-14)^{2/3}$
M2 $x \mapsto x+7$

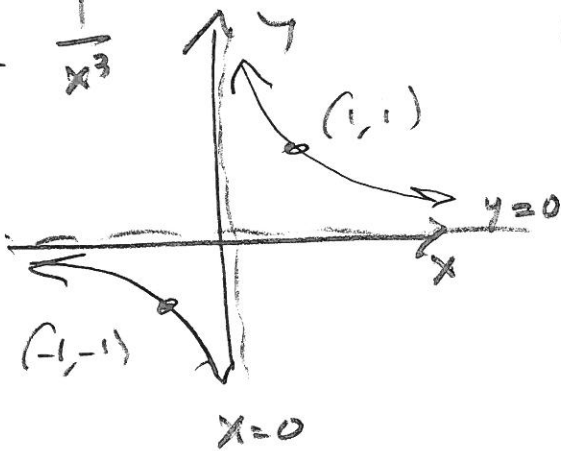


M1 $15 \mapsto \frac{15}{2}$
M2 $\frac{1}{2} \mapsto \frac{1}{2} + 7$
 $= \frac{1+14}{2} = \frac{15}{2}$

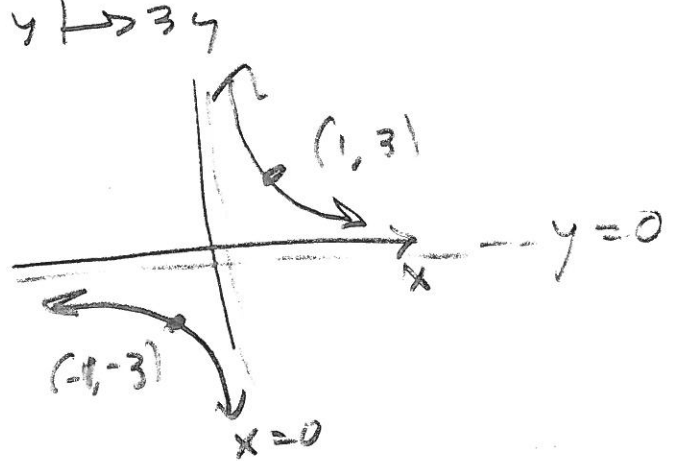
(3) $g(x) = \frac{3}{(5x-15)^3} - 6$

$g(0) < 0$

(0) $f(x) = \frac{1}{x^3}$

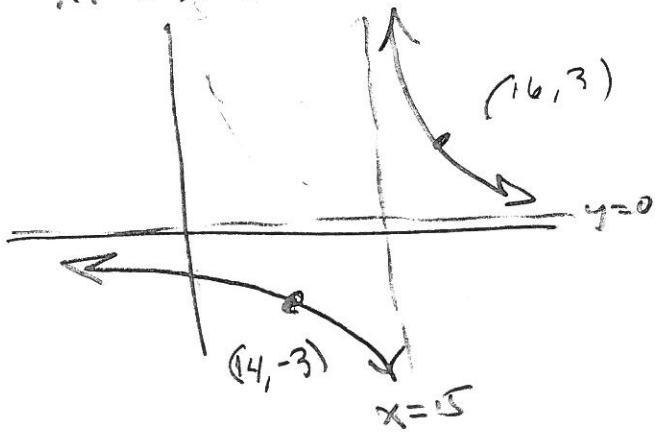


(1) $3f(x) = \frac{3}{x^3}$



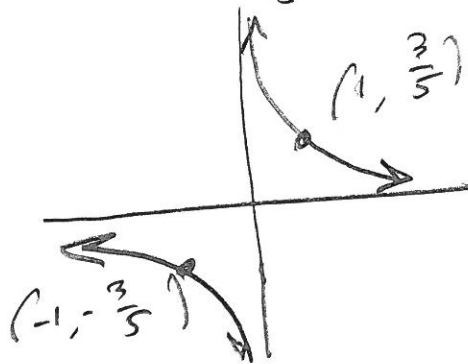
(2M1) $3f(x-15) = \frac{3}{(x-15)^3}$

$x \mapsto x+15$



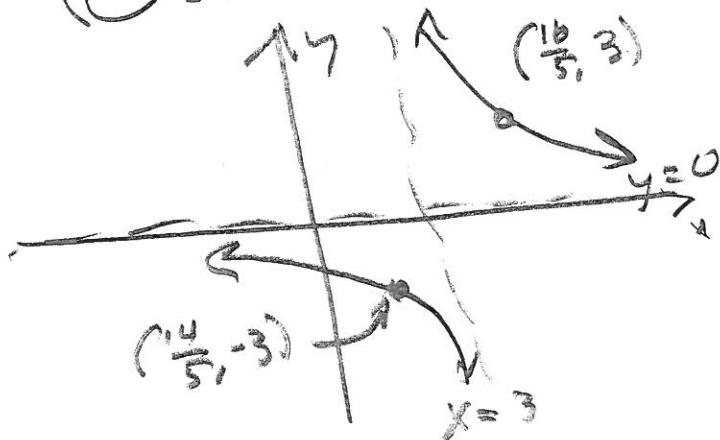
(2M2) $3f(5x) = \frac{3}{(5x)^3}$

$x \mapsto \frac{1}{5}x$

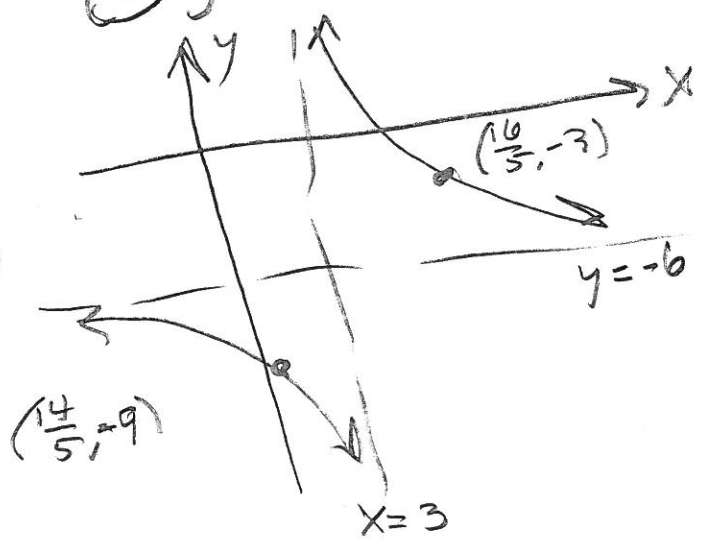


(3M1) $3f(5x-15)$ $x \mapsto \frac{1}{5}x$

(M2) $3f(5(x-3))$ $x \mapsto x+3$



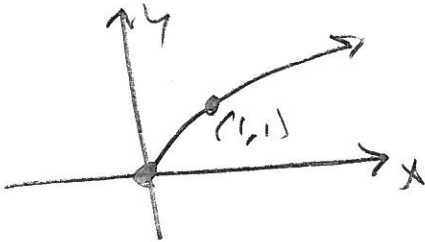
(4) $g(x)$ Down 6 from #3



(4) $g(x) = 4 \sqrt{5x+30} - 11 = 4 \sqrt{5(x+6)} - 11$

$g(0) > 0$

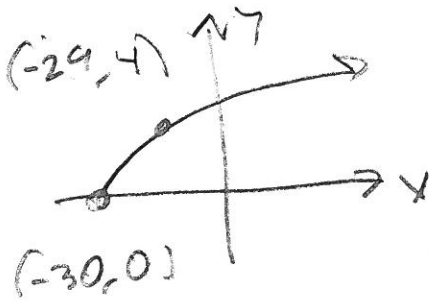
(0) $f(x) = \sqrt{x}$



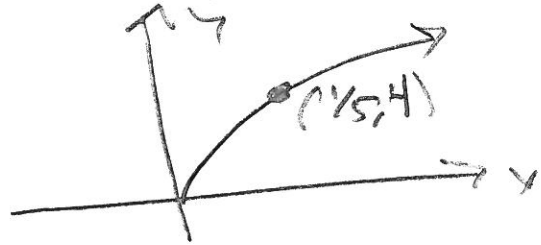
(1) $4f(x) = 4\sqrt{x}$



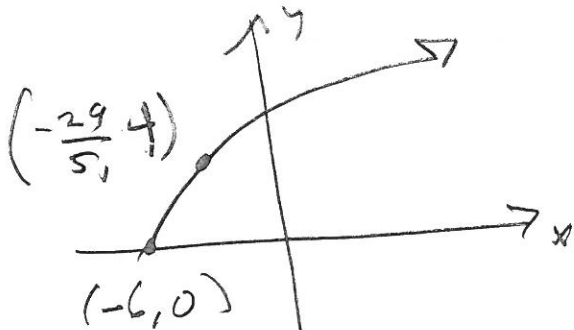
(2M1) $4f(x+30) = 4\sqrt{x+30}$
 $x \mapsto x-30$



(2M2) $4f(5x) = 4\sqrt{5x}$
 $x \mapsto \frac{1}{5}x$

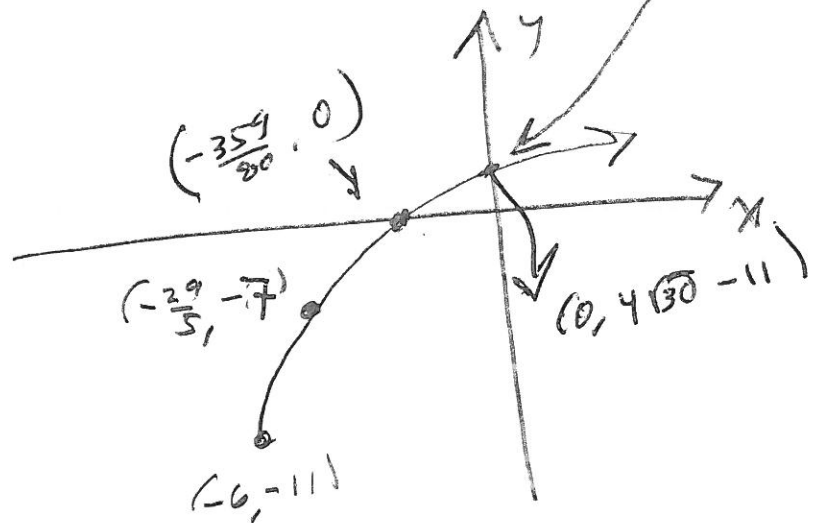


(3) $4f(5x+30) = 4f(5(x+6))$
 $x \mapsto \frac{1}{5}x$ $x \mapsto x-6$



$\frac{m1}{-29/5}, \frac{m2}{1/5 - 6} = -29/5$

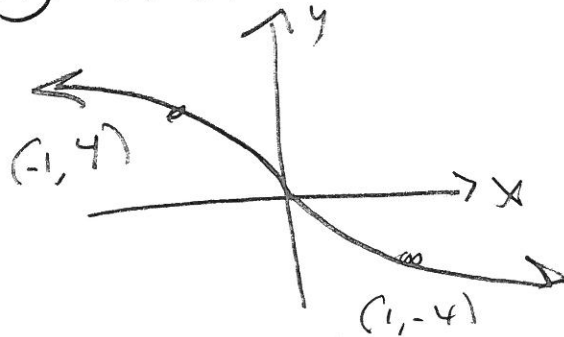
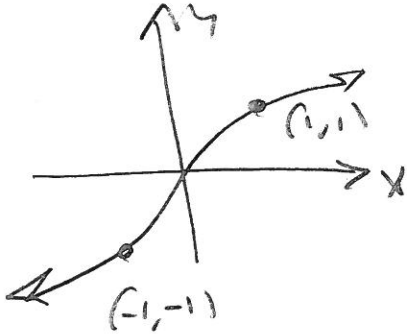
(4) $g(x)$ $y \mapsto y-11$



5) $g(x) = -4\sqrt[3]{5x+30} - 11$

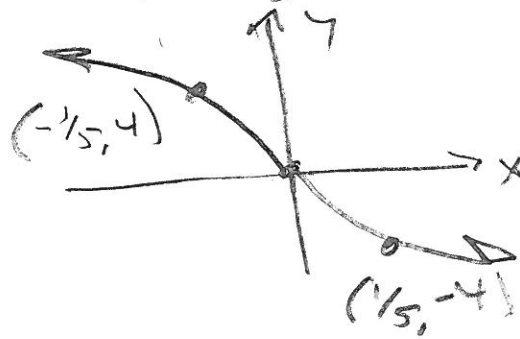
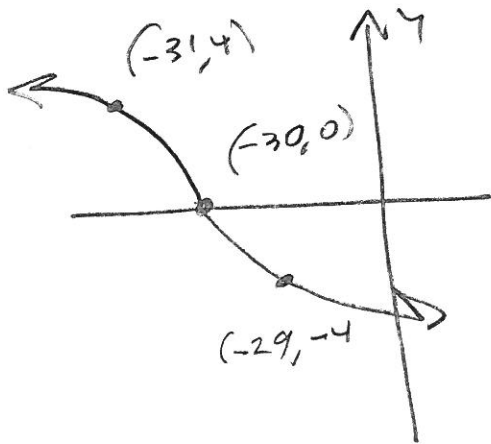
6) $f(x) = \sqrt[3]{x}$

1) $-4f(x) = -4\sqrt[3]{x}$ $y \mapsto -4y$



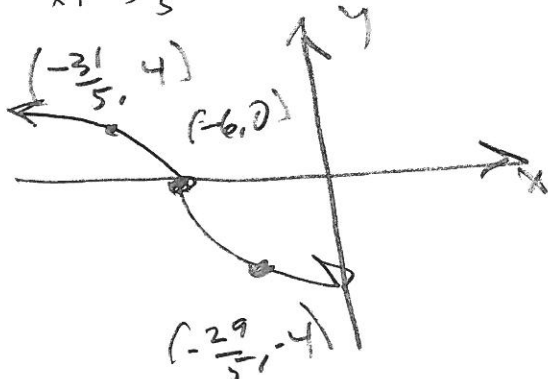
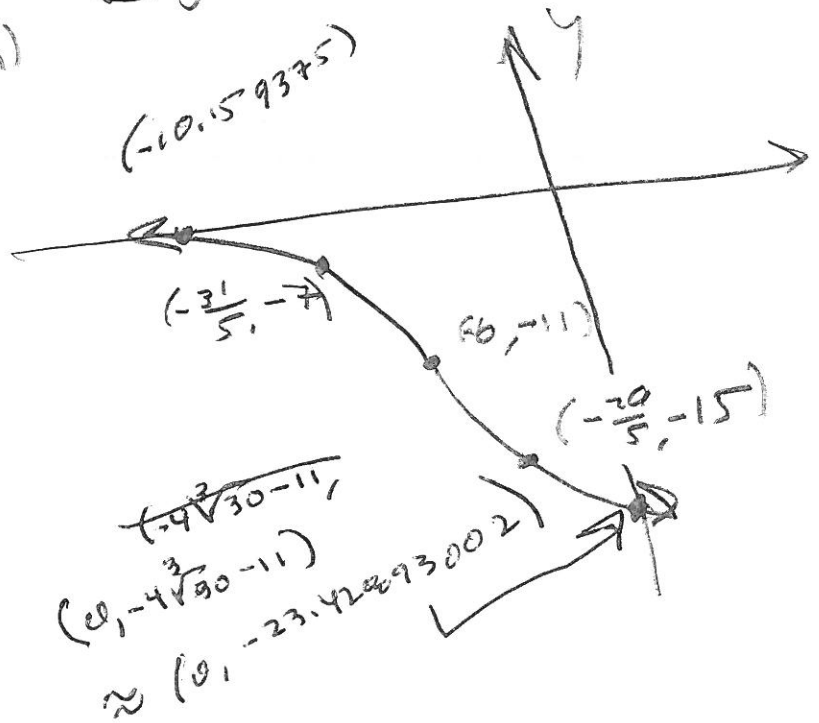
2M1) $-4f(x+30)$
 $x \mapsto x-30$

2) M2) $-4f(5x)$
 $x \mapsto \frac{1}{5}x$



4) $g(x) = \text{previous, down 11}$

3) $-4f(5x+30) = -4f(5(x+6))$
M1 $x \mapsto \frac{1}{5}x$
M2 $x \mapsto x-6$



M1) $-\frac{29}{5}$, M2) $\frac{1}{5}-6$
 $= -\frac{29}{5}$ ✓

$(-4\sqrt[3]{30-11}, -11)$
 $(0, -4\sqrt[3]{30-11})$
 $\approx (0, -23.42293002)$

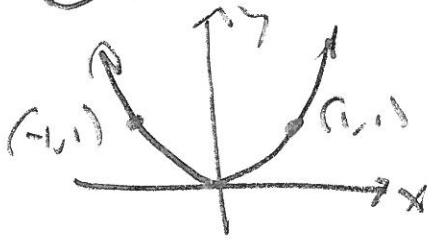
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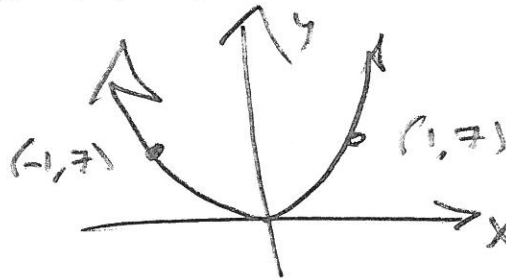
(6)

$$g(x) = 7(8x+16)^6 + 9$$

(0) $f(x) = x^6$

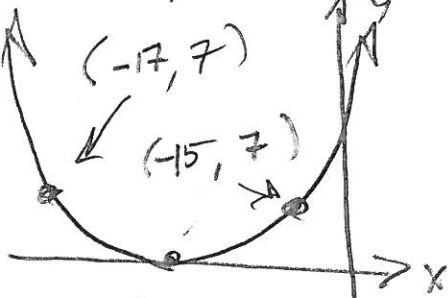


(1) $7f(x) = 7x^6$



(M1) $7f(x+16)$

$x \mapsto x-16$

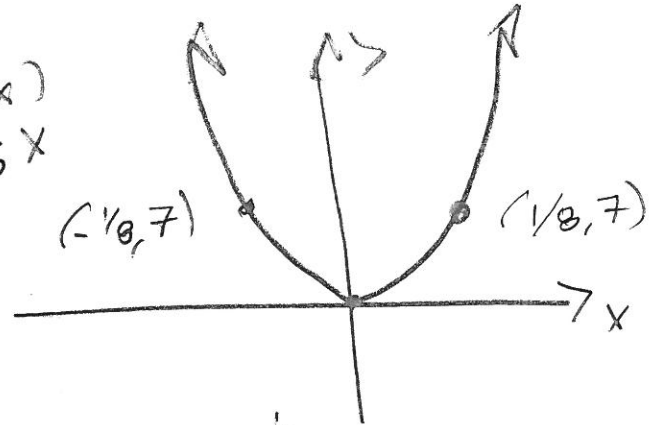


$(-16,0)$

$7(x+16)^6$

(M2) $7f(8x)$

$x \mapsto \frac{1}{8}x$

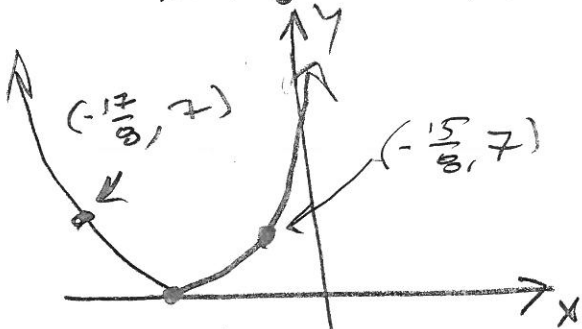


$7(8x)^6$

(3) $7f(8x+16) = 7(8(x+2))$

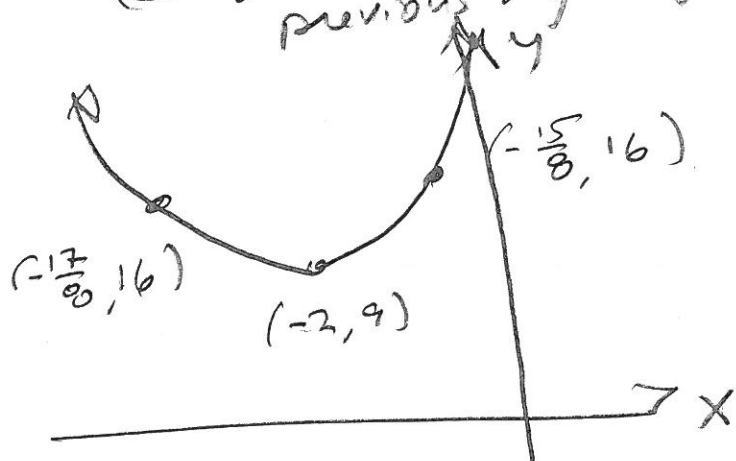
(M1) $x \mapsto \frac{1}{8}x$

(M2) $x \mapsto x-2$



$(-2,0)$

(4) $g(x) = 4P$ from previous $y \mapsto y+9$

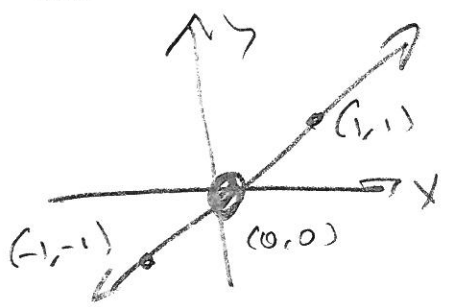


(M1) $x \mapsto \frac{1}{8}x$

(M2) $x \mapsto x-2$
 $(\frac{1}{8} - 2 = -\frac{15}{8})$

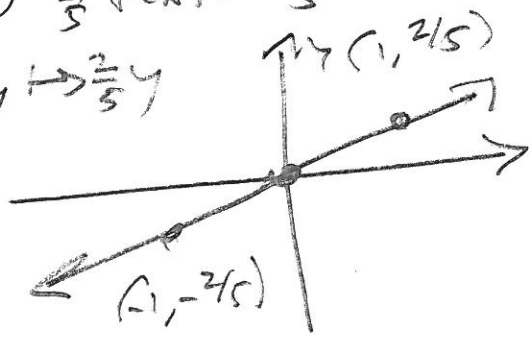
(7) $g(x) = \frac{2}{5}(x+4) + 2$

(0) $f(x) = x$



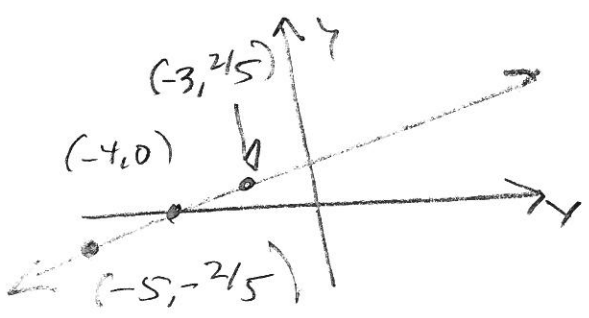
(1) $\frac{2}{5}f(x) = \frac{2}{5}x$

$y \mapsto \frac{2}{5}y$



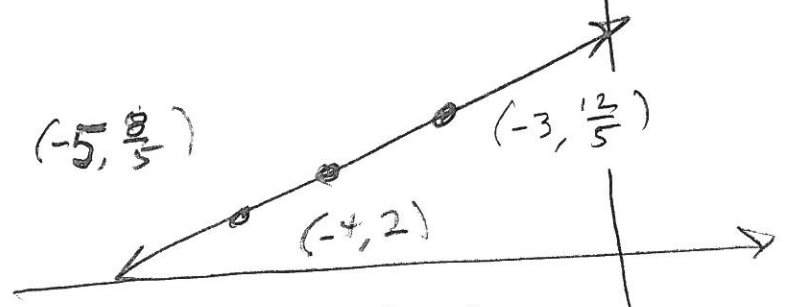
(2) $\frac{2}{5}f(x+4)$

$x \mapsto x - 4$



(3) $\frac{2}{5}f(x+4) + 2$

up $\frac{2}{5}$

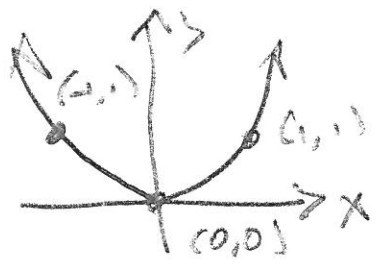


$\frac{2}{5} + 2 = \frac{2+10}{5} = \frac{12}{5}$

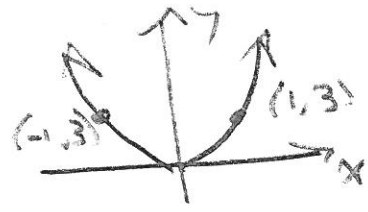
$-\frac{2}{5} + 2 = \frac{-2+10}{5} = \frac{8}{5}$

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

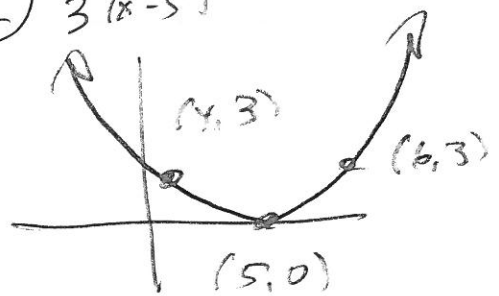
(0) $f(x) = x^2$



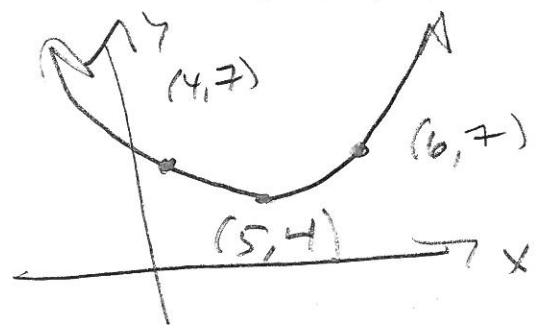
(1) $3x^2$



(2) $3(x-5)^2$



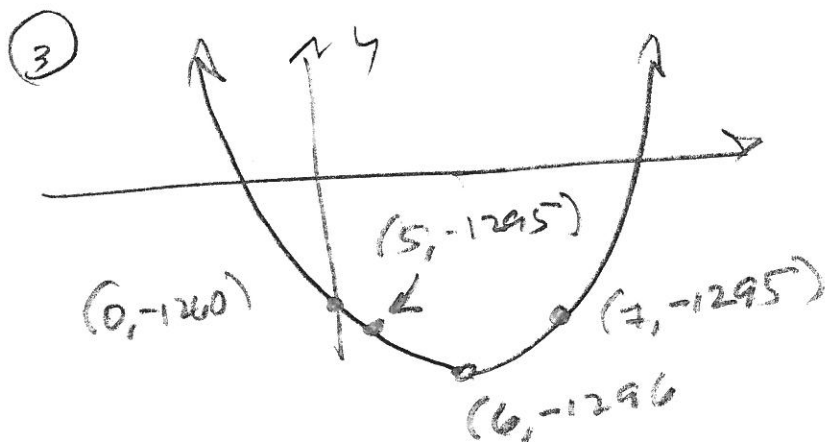
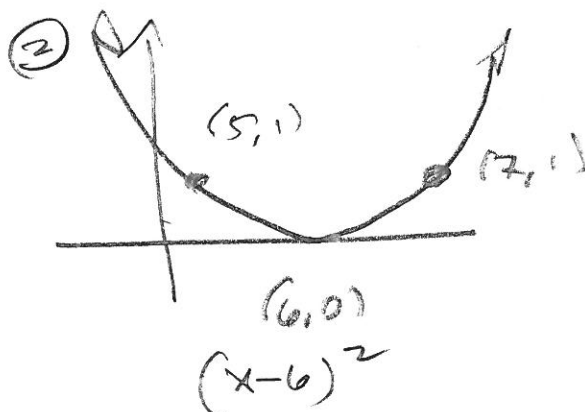
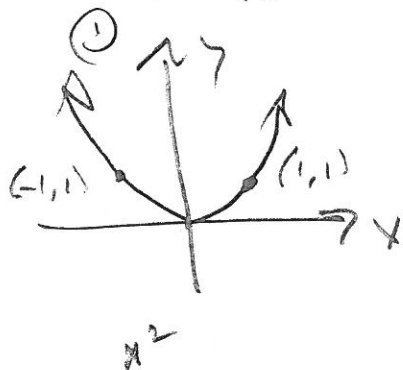
(3) $g(x)$



$$\textcircled{9} \quad g(x) = x^2 - 12x - 1260$$

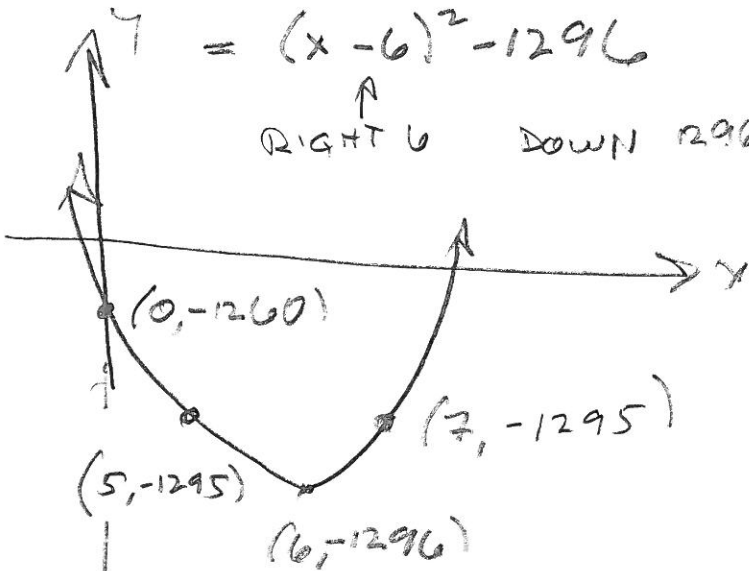
$$= x^2 - 12x + 6^2 - 36 - 1260$$

$$= (x-6)^2 - 1296$$



(9) $g(x) = x^2 - 12x - 1260$

$= x^2 - 12x + 6^2 - 36 - 1260$



$(1,1) \rightarrow (7,1) \rightarrow (7,-1295)$
 $(-1,1) \rightarrow (5,1) \rightarrow (5,-1295)$
 $(0,0) \rightarrow (5,0) \rightarrow (5,-1296)$

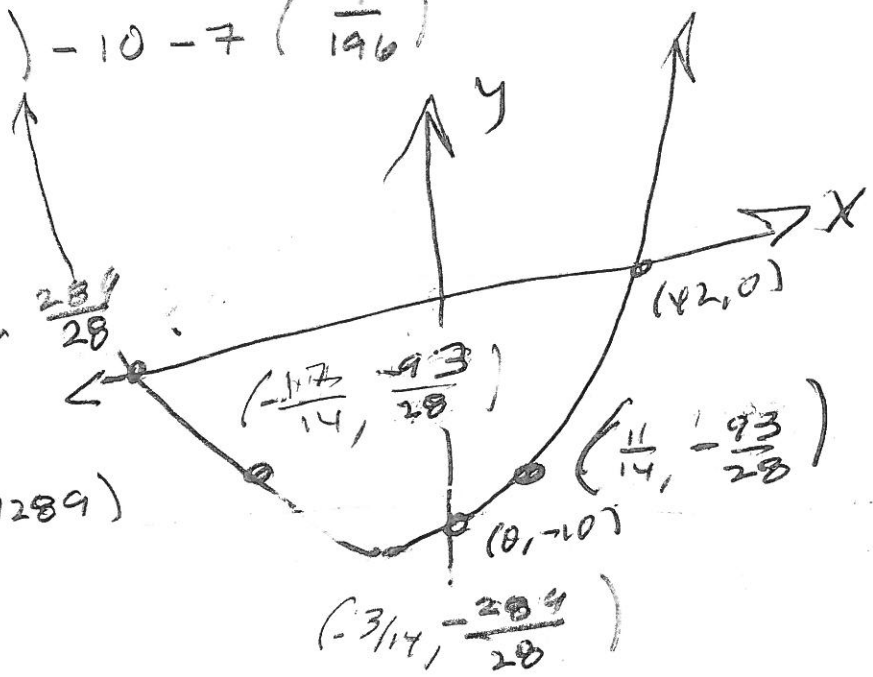
$7 \left(\frac{9}{196} \right)$
 28

(10) $g(x) = 7x^2 + 3x - 10$
 $= 7 \left(x^2 + \frac{3}{7}x \right) - 10$

$= 7 \left(x^2 + \frac{3}{7}x + \left(\frac{3}{14} \right)^2 \right) - 10 - 7 \left(\frac{9}{196} \right)$

$= 7 \left(x + \frac{3}{14} \right)^2 - \frac{289}{28}$

stretch \uparrow \leftarrow \uparrow \leftarrow \uparrow
 $7 \rightarrow 7$ $3/14$ $289/28$
 Down $289/28$



$(1,1) \rightarrow (1,7) \rightarrow \left(\frac{11}{14}, 7 \right)$
 $\rightarrow \left(\frac{11}{14}, -1289 \right)$
 $1 - \frac{3}{14} = \frac{11}{14}$

$7 - \frac{289}{28} = -\frac{93}{28}$

⑩

M1 for parabolas

$$g(x) = 7x^2 + 3x - 10$$

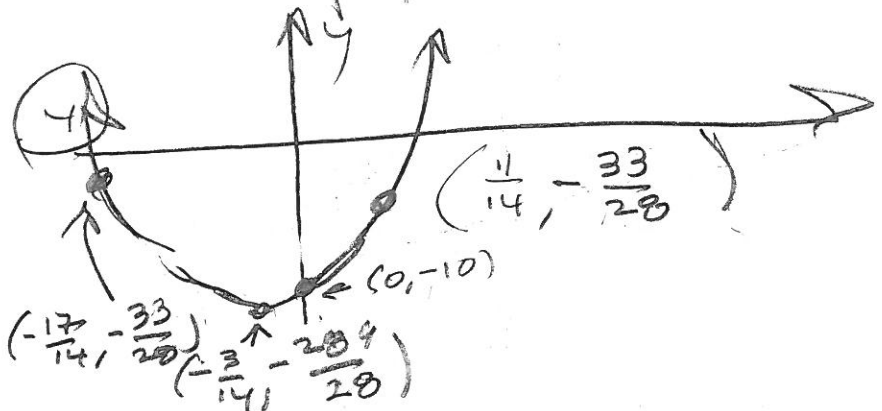
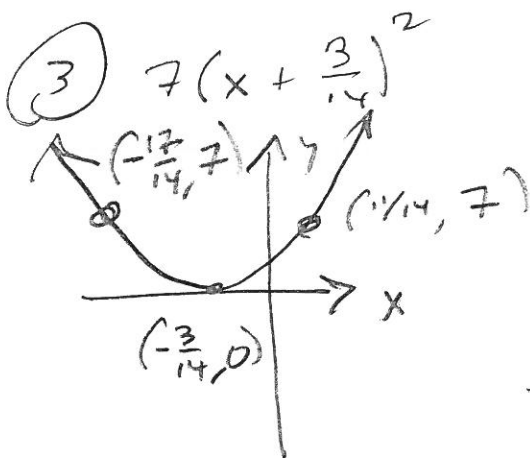
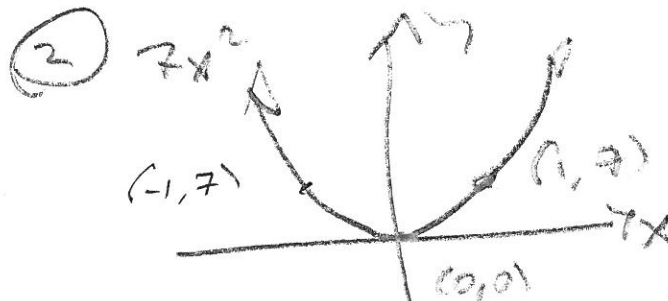
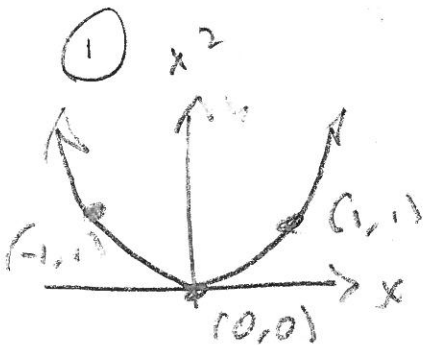
$$= 7\left(x^2 + \frac{3}{7}x\right) - 10$$

$$= 7\left(x^2 + \frac{3}{7}x + \left(\frac{3}{14}\right)^2\right) - 10 - 7\left(\frac{9}{196}\right)$$

$$\text{Scratch: } -10 - 7\left(\frac{9}{196}\right) = -10 - \frac{9}{28} = \frac{-280-9}{28}$$

$$= -\frac{289}{28}$$

$$\dots = 7\left(x + \frac{3}{14}\right)^2 - \frac{289}{28}$$



$$7 \cdot \frac{-289}{28} = -\frac{93}{28} \approx -3.3214$$

$$1 - \frac{3}{14} = \frac{11}{14}$$

$$-1 - \frac{3}{14} = -\frac{17}{14}$$