Review 2
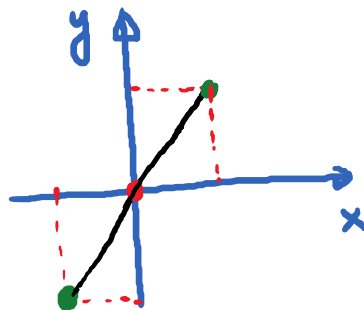
MC Part

#1 $\left(3, \dfrac{27}{2}\right)$. Symmetric w.r.t. the origin.

Ans: $\left(-3, -\dfrac{27}{2}\right)$

#2 The graph has symmetry with respect to the origin.

So, it is the graph of an odd function.

#3 Key point (Given): $(5, -4)$

Transformation (Given): $g(x) = f\left(-\dfrac{1}{4}x\right)$

Q: What does this key point transform to?

$$g(x) = f\left(-\frac{1}{4}x\right)$$

(I) Stretch horizontally by a factor of 4

(II) Reflect across y-axis

$$(5,-4) \xrightarrow[\text{Stretch}]{\text{(I)}} (20,-4) \xrightarrow[\text{Reflect}]{\text{(II)}} (-20,-4)$$

#4   Parent function: $y = x^2$

Transformed function: $y = 0.1(x+2)^2 - 4$

Transformations?   Left, 2 units.

Shrink vertically by a factor of 0.1

Down 4 units.

#5 $2x^2 = -2x - 5 \rightarrow$ $\boxed{2}x^2 + \boxed{2}x + \boxed{5} = 0$

$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad a\quad\quad b\quad\quad\quad c$

Discriminant $= b^2 - 4ac = 4 - 4 \cdot 2 \cdot 5 = -36 < 0$

$\quad\quad\quad \rightarrow 2$ Non-real solutions.

#6 $f(x) = -4x^2 - 16x - 21$

Vertex formula: x-vertex $= h = -\dfrac{b}{2a} = -2$

$\quad\quad y_{vertex} = k = f\left(-\dfrac{b}{2a}\right) = f(-2) = -5$

$\boxed{\text{Vertex} = (-2, -5)}$

#7 $f(x) = 2x^2 - 16x + 37.$

$\quad\quad$ Axis of Symmetry: $x = -\dfrac{b}{2a} = \dfrac{16}{4} = 4$

$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad \boxed{x = 4}$

#8 $f(x) = x^2 - 20x + 106$

Since $a = 1 > 0$, f has a minimum.
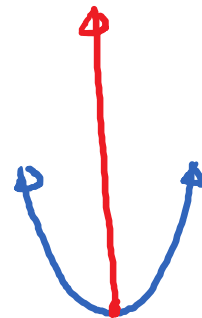
Minimum value $= y_{vertex} = k$

$x_{vertex} = h = -\frac{b}{2a} = 10$

So, $y_{vertex} = k = f\left(-\frac{b}{2a}\right) = f(10) = 6$

So, $\boxed{\text{Minimum value of } f = 6}$

#9 $f(x) = \frac{1}{2}x^2 - 2x - \frac{21}{2}$

Since $a = \frac{1}{2} > 0$, parabola points up.

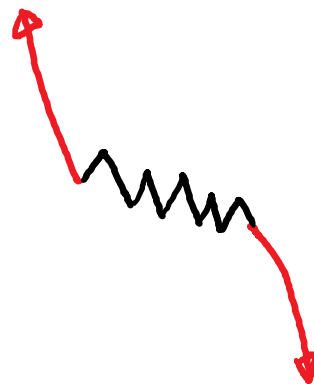Range $= [k, \infty)$. $k = f\left(-\frac{b}{2a}\right) = f(2) = -\frac{25}{2}$

$\downarrow$ y_{vertex}

$\boxed{\text{Range} = \left[-\frac{25}{2}, \infty\right)}$

#10 Easy.

#11 Leading Term Test

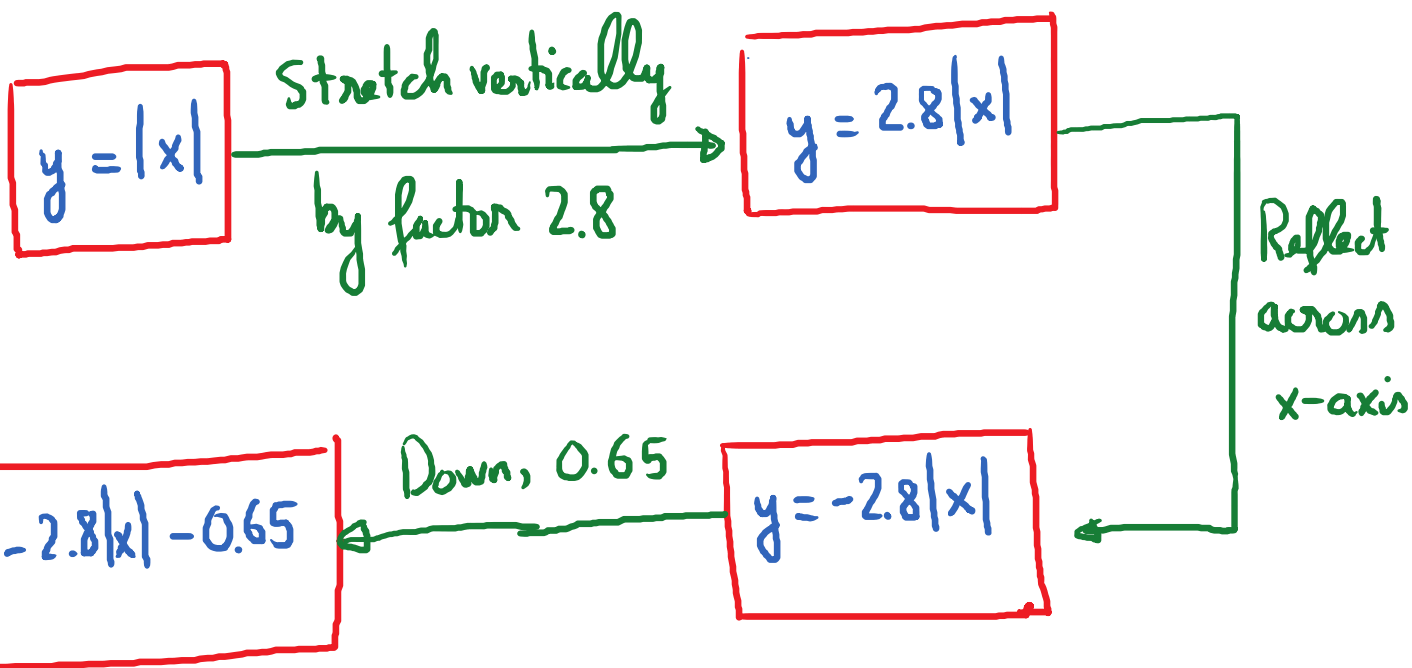Leading term = $-0.4 x^{\boxed{7}}$ odd

< 0

#12 $N(x) = x^2 - \boxed{x} \longrightarrow$ # of teams

total # of games

$x = 10, \quad N(10) = 100 - 10 = 90$ games

Total cost = $(\$44) \cdot (90) = \boxed{\$3960}$

Short Answer Part

#13

$y = |x|$ $\xrightarrow{\text{Stretch vertically by factor 2.8}}$ $y = 2.8|x|$

Reflect across x-axis

$y = -2.8|x| - 0.65$ $\xleftarrow{\text{Down, 0.65}}$ $y = -2.8|x|$

#14 Second graph is obtained from the first graph by shrinking it vertically by a factor of $\frac{1}{2}$.
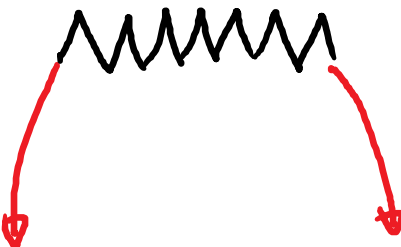
So, $g(x) = \frac{1}{2} f(x) = \frac{1}{2}\left(-x^3 + 3x\right)$

#15 Quadratic formula.

$$x =$$

#16 Max profit $= y_{vertex} = f\left(-\frac{b}{2a}\right) = f(6)$

$$= \$79$$

#17 Leading term $= \underset{< 0}{\boxed{-1.74}} x^{\boxed{4} \ even}$

End Behavior $=$

#18 $8x^3 + x^2 - 72x - 9 = 0$

$$x^2(8x+1) - 9(8x+1) = 0$$

$$(8x+1)(x^2-9) = 0$$

$$(8x+1)(x+3)(x-3) = 0$$

$$x = -\frac{1}{8} \; ; \; x = -3 \; ; \; x = 3$$

Essay Part

(19) $f(x) = \frac{1}{2}x^2 - 6x - \frac{13}{2}$
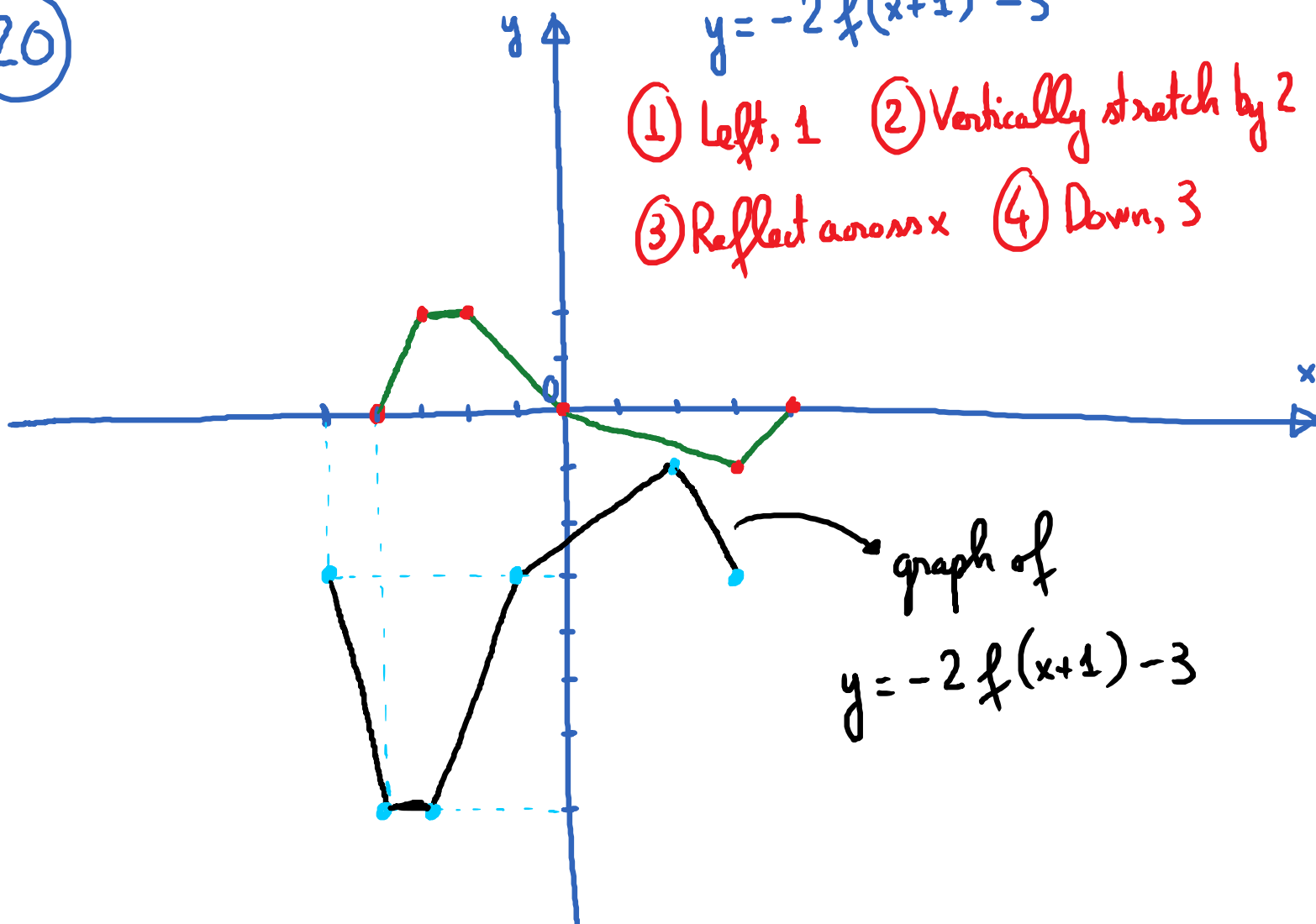
Since $a = \frac{1}{2} > 0$, f has a minimum.

Minimum value $= y_{vertex} = f\left(-\frac{b}{2a}\right) = f(6) = \boxed{\dfrac{-49}{2}}$

(20)

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

① Left, 1   ② Vertically stretch by 2

③ Reflect across x   ④ Down, 3

graph of

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