

1. A. Point $(40, 290)$ changes to $(40, 1160)$. The only change that occurs is along the y -axis. Therefore, the wages is shifted $(1160 - 290) = 870$ dollars upward.

2. D. For example $y = x^2$ does not have inflection points since it is always concave up or concave down.

3. (a) The graph is shifted 2 units to the left and then 6 units downwards.

(b) Let's say parent graph $= f(x) = x$

$$g(x) = (x+2) - 6$$

4 $y = x^2 + x + 6$

Vertex $= (h, k)$

$$y = ax^2 + x + 6$$

$$h = -\frac{b}{2a} = -\frac{1}{2(1)} = -\frac{1}{2}$$

$$k = y(h) = \left(-\frac{1}{2}\right)^2 + \left(-\frac{1}{2}\right) + 6 = \frac{23}{4}$$

$$\text{Vertex} = \left(-\frac{1}{2}, \frac{23}{4}\right)$$

5 $s(t) = -16t^2 + 30t + 6$

When the ball hits the ground, $s(t) = 0$

$$-16t^2 + 30t + 6 = 0$$

$$t_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$t_{1,2} = \frac{-30 \pm \sqrt{30^2 - 4(-16)(6)}}{2(-16)}$$

$$t_{1,2} = \frac{-30 \pm \sqrt{1284}}{-32} = \frac{-15 \pm \sqrt{321}}{16}$$

$$t_{1,2} = -0.1823, 2.0573$$

Since we cannot have negative time, we will end up with

$$t = 2.0573 \text{ s}$$

The ball strikes the ground after 2.0573 seconds

6. (a)

Years t	y
0	1.215
5	0.928
10	0.766
15	0.656
20	0.581
25	0

The dependent variable is the value of the dollar.
The independent variable is years after t.

6. (b)

Years t	Value V	1st diff	2nd diff
0	1.215		
5	0.928	-0.287	
10	0.766	-0.162	0.125
15	0.656	-0.11	0.052
20	0.581	-0.075	0.035
25	0.512	-0.069	0.006

(c) The first differences are negative which means that the function is decreasing.

The second differences are positive which means that the function is concave down.

7 (a) Regression equation.

$$R = 13.6889 + 11.2167t$$

$$R = 13.689 + 11.217t$$

The correlation coefficient is 0.974
It means that 97.4% of the variation in the revenue can be explained by the number of years after 2000.

(b)

$$t = 2020 - 2000 = 20$$

$$R(20) = 13.689 + 11.217(20)$$

$$= \$238.029 \text{ billion dollars}$$

(c)

