

U3/L5 HW

1. x-int of $1+\sqrt{2}$ and $pt(2,4)$

$$\begin{aligned} y &= a(x - (1+\sqrt{2}))(x - (1-\sqrt{2})) \\ &= a(x - 1 - \sqrt{2})(x - 1 + \sqrt{2}) \\ &= a(x^2 - x + \sqrt{2}x - x + 1 - \sqrt{2} - \sqrt{2}x + \sqrt{2} - 2) \\ &= a(x^2 - 2x - 1) \end{aligned}$$

sub (2,4)

$$4 = a(4 - 4 - 1)$$

$$4 = -a$$

$$a = -4$$

$$\begin{aligned} \therefore y &= -4(x^2 - 2x - 1) \\ &= -4x^2 + 8x + 4 \end{aligned}$$

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

sub (-3, -11)

$$-11 = a(-4)^2 + 5$$

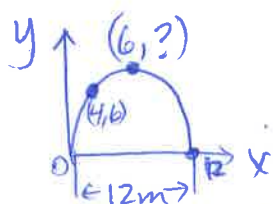
$$-16 = 16a$$

$$a = -1$$

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

3. Text. pp 192-193 10, 14, 16

10.



can a truck that's 5m tall and 3.5m wide pass through the tunnel?

(i) $y = ax(x-12)$
sub (4, 6)

$$6 = a(4)(4-12)$$

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

$$6 = -32a$$

$$a = -\frac{3}{16}$$

$$\therefore y = -\frac{3}{16}ax(x-12)$$

x-coord for left side of truck: $6 - \frac{3.5}{2}$
 $= 6 - 1.75$

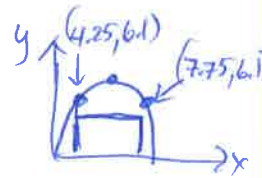
Text answer is slightly wrong. It should say with a width of 3.5m the tunnel's height is 6.1m and the truck is only 5m tall.

(ii) sub $x = 4.25$

$$y = -\frac{3}{16}(4.25)(4.25-12)$$

$$= -\frac{3}{16}(4.25)(-7.75)$$

$$\approx 6.1$$



$\therefore$ The truck can pass through the tunnel since it is only 5m tall and the tunnel is 6.1m in height at the left and right edges of the truck.

14. From given graph $V: (-2, 3)$

$$y = a(x+2)^2 + 3$$

sub $(4, -9)$

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

$$-12 = 4a$$

$$a = -3$$

$$\therefore y = -3(x+2)^2 + 3$$

or use x-int of $(-1, 0)$ and $(-3, 0)$

$$y = a(x+1)(x+3)$$

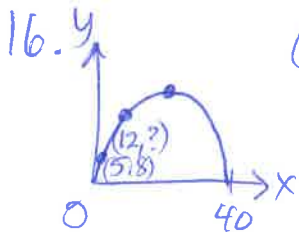
sub $(-4, -9)$

$$-9 = a(-3)(-1)$$

$$a = -3$$

$$\therefore y = -3(x+1)(x+3)$$

$$\text{OR } y = -3(x^2 + 4x + 3) \\ = -3x^2 - 12x - 9$$



(i) $y = ax(x-40)$

sub $(5, 8)$

$$8 = a(5)(-35)$$

$$8 = -175a$$

$$a = \frac{-8}{175}$$

$$\therefore y = \frac{-8}{175}x(x-40)$$

(ii) sub $x = 12$

$$y = \frac{-8}{175}(12)(12-40)$$

$$= \frac{-8}{175}(12)(-28) = 4$$

$$= \frac{384}{175}$$

$$= 15.36$$

$\therefore$ 12m from one end, the height of the parabolic bridge is exactly 15.36 m.