U3/L6 Practice

p.198

2c) ① $f(x) = 3x^2 - 2x - 1$ ② $g(x) = -x - 6$

① = ②

$3x^2 - 2x - 1 = -x - 6$

$3x^2 - x + 5 = 0$

$\because D = b^2 - 4ac$

$= 1 - 60$

$= -59$

$\therefore$ There are zero POI's

3. ① $f(x) = 4x^2 + x - 3$, ② $g(x) = 5x - 4$

① = ②

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

$4x^2 - 4x + 1 = 0$

$\because D = b^2 - 4ac$

$= 16 - 16$

$= 0$

$\therefore$ There is one POI

Could factor in 4a)

$-(2x^2 + 11x - 21) = 0$

$-(2x - 3)(x + 7) = 0$

$\therefore x = \frac{3}{2}$ and -7

4.a) ① $f(x) = -2x^2 - 5x + 20$

② $g(x) = 6x - 1$

(i) ① = ②

$-2x^2 - 5x + 20 = 6x - 1$

$-2x^2 - 11x + 21 = 0$

$\because D = b^2 - 4ac$

$= 121 + 168$

$= 289$

$\therefore$ 2 sol^{ns}

(ii) $x = \frac{-b \pm \sqrt{D}}{2a}$

$= \frac{11 \pm 17}{-4}$

$= -7$ or $\frac{3}{2}$

$g(-7) = 6(-7) - 1$

$= -43$

$g(\frac{3}{2}) = 6(\frac{3}{2}) - 1$

$= 8$

$\therefore$ The POI's are $(\frac{3}{2}, 8)$ and $(-7, -43)$

c) ① $f(x) = 5x^2 + x - 2$

② $g(x) = -3x - 6$

① = ②

$5x^2 + x - 2 = -3x - 6$

$5x^2 + 4x + 4 = 0$

$\because D = b^2 - 4ac$

$= 16 - 4(5)(4)$

$= 16 - 80$

$= -64$

$\therefore$ no sol^{ns}

6. ① $R(t) = -50t^2 + 300t$ ② $C(t) = 60 - 50t$, t = ticket price in \$

To break even, $R(t) = C(t)$, so ① = ②

$-50t^2 + 300t = 600 - 50t$

$-50t^2 + 350t - 600 = 0$

$-50(t^2 - 7t + 12) = 0$

$-50(t - 4)(t - 3) = 0$

$\therefore t = 3$ or $t = 4$

$\therefore$ The cheapest ticket price that allows them to break even is \$3.00.

8. ① $g(x)=3x+k$ ② $f(x)=2x^2-5x+3$

$$① = ②$$

$$3x+k = 2x^2-5x+3$$

$$0 = 2x^2-8x+(3-k)$$

$$D = 64-4(2)(3-k)$$

$$= 64-8(3-k)$$

$$= 64-24+8k$$

$$= 40+8k$$

$\because D=0$ for 1 PoI

$$\therefore \quad 0 = 40+8k$$

$$k=-5$$

9. ① $g(x)=4x+k$, ② $f(x)=-3x^2-x+4$

$$① = ②$$

$$4x+k = -3x^2-x+4$$

$$0 = -3x^2-5x+(4-k)$$

$$D = 25-4(-3)(4-k)$$

$$= 25+12(4-k)$$

$$= 73-12k$$

$\because D<0$ when there are no PoI's

$$\therefore \quad 73-12k<0$$

$$-12k<-73$$

$$\boxed{k>\frac{73}{12}}$$

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14. ① $x^2-2x+3y+6=0$ ② $2x+3y+6=0$

set ① = ②

$x^2-2x+3y+6 = 2x+3y+6$ Subtr. $2x$, $3y$ and 6 from b.s.

$$x^2-4x=0$$

$$x(x-4)=0$$

$\boxed{x=0}$ and $\boxed{x=4}$

sub $x=0$ in ②

$$3y+6=0$$

$$3y=-6$$

$$\boxed{y=-2}$$

sub $x=4$ in ②

$$2(4)+3y+6=0$$

$$8+3y+6=0$$

$$3y=-14$$

$$\boxed{y=-\frac{14}{3}}$$

$\therefore$ The PoI's are $(0,-2)$ and $\left(4,-\frac{14}{3}\right)$.