Answers to Sheets 1 to 4

Sheet 1

Task 5 Minimum: $(-0.3, -7.9)$, roots: 0.59, -1.19.

Task 6 Roots: $-\frac{\sqrt{79}}{10} - \frac{3}{10}$ and $+\frac{\sqrt{79}}{10} - \frac{3}{10}$, or -1.188 and 0.589 to 3d.p.

Task 7 Max: $(-5.3, 138.2)$ Min: $(-3.1, -60.2)$ Max: $(-0.4, 108.5)$ Min: $(1.6, -36.9)$.

Roots: $-6, -4, -2, 1, 2$.

Task 9 Asymptotes: $x = 2$, $x = -2$ Roots: $-0.714, 1.912, -2.199$ Max: $(1.505, 1.929)$ Min: $(2.497, 3.944)$.

Task 10 Asymptote: $x = 2$, Root: -0.839 Max: $(1, -1)$ Mins: $(0.382, -1.090)$, $(2.618, 10.090)$. Does not have asymptotes as x tends to $\pm\infty$.

Sheet 2

Problem 1 $2(x-1)(2x-15)$, $x = 1$, $0 \leq \alpha \leq 1$, $4y^2 - 2(\lambda+1)y + \alpha\lambda$ (after removing common factor of a^2). Min at $x = 1$, $y = 1$.

Problem 2 $\alpha = 0.5$: $\theta = \pi$. $\alpha = 1$: $\theta = 2\pi$. Table entries: $1.766, 2.310, 3.142, 3.973$.

Problem 3 $c = 0.404$.

Sheet 3

Problem 4 (i) $(0, 4)$ (ii) $(-2, 0)$, (i) $(0, 4)$ (ii) $(2, 0)$, slopes 2 and -2.

Problem 5 AB: $m = \frac{13}{5}$, $y = \frac{13}{5}x + \frac{4}{5}$. AC: $m = \frac{3}{5}$, $y = \frac{3}{5}x - \frac{26}{5}$. BC: $x = 2$. Area: 25.

Problem 6 The lines are parallel. $c = \sqrt{13}$, $(0.832, 0.555)$.

Problem 7 $P = \sqrt{\frac{41}{2}}$, $x = 0.331$, $y = 0.883$.

Problem 8 $(1.75, 0.5)$, $P = 6.25$.

Sheet 4

Problem 9 $X = 175$, $Y = 50$, $P = 6250$.

Problem 10 First row: $3, 2, 3600$. Second row: $2, 8, 3600$. $x = 1080$, $y = 180$, $P = 8860$.

Problem 11 $400x + 300y = c$, $x + y \leq 20,000$, $x \geq 4000$, $y \geq 5000$, $x + y \geq 10000$, Answer: $x = 4000$, $7 = 6000$, $C = 3400000$.

Problem 12 Adults: most 22, least 9. Kids: most 33, least 15. Max profit 20.50.