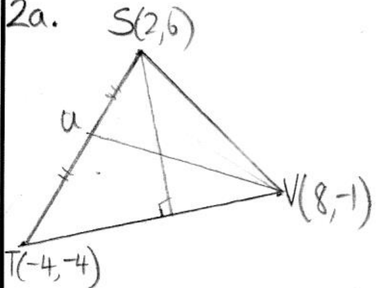
Higher HW3

1a(i) $f(g(x)) = f(2x-3)$
$= 2(2x-3)+3$
$= 4x-6+3$
$= \underline{\underline{4x-3}}$

a(ii) $g(f(x)) = g(2x+3)$
$= 2(2x+3)-3$
$= 4x+6-3$
$= \underline{\underline{4x+3}}$

b. $(4x-3)(4x+3)$
$= 16x^2 - 9$
The minimum value for $16x^2$ is 0, so the least possible value for $16x^2-9$ is -9

2a.


$U\left(\frac{2-4}{2}, \frac{6-4}{2}\right)$
$= U(-1,1)$
$m_{UV} = \frac{-1-1}{8+1}$
$= \frac{-2}{9}$
$y+1 = -\frac{2}{9}(x-8)$
$9y+9 = -2x+16$
$9y = -2x+7$

b. $m_{TV} = \frac{-1+4}{8+4}$
$= \frac{3}{12}$
$= \frac{1}{4}$
$m_h = -4$
$y-6 = -4(x-2)$
$y-6 = -4x+8$
$y = -4x+14$

c. $y = -4x+14$ ①
$9y = -2x+7$ ②
× ② by −2
$y = -4x+14$
$-18y = 4x-14$
$-17y = 0$
$y = 0$
When $y=0$,
$-4x+14 = 0$
$-4x = -14$
$x = \frac{7}{2}$
$\underline{\underline{\left(\frac{7}{2}, 0\right)}}$

3a. $\frac{3}{5} + \frac{2}{7}$
$= \frac{21}{35} + \frac{10}{35}$
$= \underline{\underline{\frac{31}{35}}}$

b. $7\frac{6}{11} - 4\frac{3}{8}$
$= 3 + \frac{48}{88} - \frac{33}{88}$
$= \underline{\underline{3\frac{15}{88}}}$

c. $7\frac{6}{11} \div 4\frac{3}{8}$
$= \frac{83}{11} \div \frac{35}{8}$
$= \frac{83}{11} \times \frac{8}{35}$
$= \frac{664}{385}$
$= \underline{\underline{1\frac{279}{385}}}$

4a. $s(x) = 3x^2-4$
$y = 3x^2-4$
$y+4 = 3x^2$
$\frac{y+4}{3} = x^2$
$x = \sqrt{\frac{y+4}{3}}$
$s^{-1}(x) = \sqrt{\frac{x+4}{3}}$

$t(x) = \frac{x^4+3}{2}$
$y = \frac{x^4+3}{2}$
$2y-3 = x^4$
$x = \sqrt[4]{2y-3}$
$t^{-1}(x) = \sqrt[4]{2x-3}$

b. $t(x) = \frac{x^4+3}{2}$, $\underline{\underline{x \in \mathbb{R}, t(x) \geq 0}}$

5. $m_{KL} = \frac{1+8}{1+2}$

$= \frac{9}{3}$

$= 3$

$m_{\perp} = \frac{-1}{3}$

Midpoint $\left(\frac{-2+1}{2}, -\frac{8+1}{2}\right)$

$= \left(\frac{-1}{2}, \frac{-7}{2}\right)$

$y + \frac{7}{2} = \frac{-1}{3}\left(x + \frac{1}{2}\right)$

$6y + 21 = -2\left(x + \frac{1}{2}\right)$

$6y = -2x - 1$

$6y = -2x - 22$

$\underline{\underline{3y = -x - 11}}$

6a. $h(x) = f(g(x))$

$= f(x^2+7)$

$= 3(x^2+7) - 1$

$= 3x^2 + 21 - 1$

$= \underline{\underline{3x^2 + 20}}$

b. $\underline{\underline{(0, 20)}}$

c. $h(x) = 3x^2 + 20$, $\underline{\underline{x \in \mathbb{R}, h(x) \geq 20}}$

7. $L = \frac{b}{1-a}$

$= \frac{75}{1+0.8}$

$= \frac{75}{1.8}$

$= \frac{750}{18}$

$= \frac{125}{3}$

$= \underline{\underline{41\frac{2}{3}}}$

8a. $L = \frac{b}{1-a}$

$4 = \frac{5}{1-a}$

$4 - 4a = 5$

$-1 = 4a$

$a = -\frac{1}{4}$

$\underline{\underline{= 0.25}}$

b(i) $u_0 = 3$

$u_1 = 3m + 5$

$u_2 = m(3m+5) + 5$

$= \underline{\underline{3m^2 + 5m + 5}}$

(ii) $3m^2 + 5m + 5 = 7$

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

$(3m-1)(m+2) = 0$

$3m - 1 = 0$ or $m = -2$

$m = \frac{1}{3}$

$\underline{\underline{\text{To have no limit } m = -2}}$