

# Solutions to Worksheet 17

①  $3x - 4y + z = 0$

② (a)  $\vec{r}(t) = \langle 1, 1, 1 \rangle + t \langle 3, -4, 1 \rangle$

(b)  $\vec{r}(s) = \langle 1, 1, 1 \rangle + s \langle 8, -4, 3 \rangle$

(c) No

(d)

③  $2\sqrt{2}x + 4y + 6z = 14$

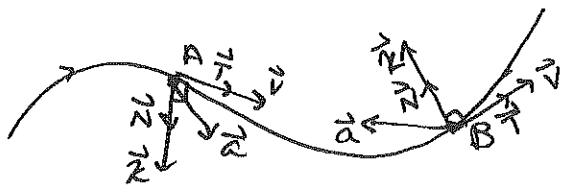
④  $L(x, y) = 10 + 2(x-1) + 35(y-1)$

$Q(x, y) = 10 + 2(x-1) + 35(y-1) + 3(x-1)^2 + 2(x-1)(y-1) + 36(y-1)^2$

⑤ (a)  $\vec{v}(0) = \langle 0, 4, 1 \rangle$

$\vec{a}(0) = \langle 6, 0, 0 \rangle$

(b)



⑥  $h_x(x, y) = 3f_u(3x+2, 9y+x^2, 3xy) + 2x \cdot f_v(3x+2, 9y+x^2, 3xy) + 3y \cdot f_z(3x+2, 9y+x^2, 3xy)$

$h_y(x, y) = 9 \cdot f_v(3x+2, 9y+x^2, 3xy) + 3x \cdot f_z(3x+2, 9y+x^2, 3xy)$

⑦  $h_x(x, y) = f'(x^2 + y^2 + 2xy)(2x + 2y)$

$h_y(x, y) = f'(x^2 + y^2 + 2xy)(2y + 2x)$

⑧ (a)  $\begin{cases} x = t \\ y = 2t^2 + \sqrt{t} \end{cases}$  (b)

⑨  $(0, \pm 2/3)$  saddles

⑩  $(1, 0)$ : max

$(-1, 0)$ : min