Practice Exam 1

1a) $(-10, -7, 3)$
b) $16/\sqrt{29}$
c) $(-7, 6, -6)$

2a) $\langle -1/2, -1/2, 1\rangle$
b) $\langle 3/2, 1/2, 1\rangle$
c) $3/\sqrt{2}$

3a) $x = 2t; \quad y = 5/2 - 5t; \quad z = 1 - 4t$ (there are many other solutions)
b) Intersect at $(0, 2, 1)$

4a) 13
b) $-7x + 6y - 8z = 1$
c) $\cos^{-1}(7/\sqrt{174})$

5a) $(15, 47/3, 8)$
b) $x = 15 + 8t; \quad y = 47/3 + 4t; \quad z = 8 + t$
c) Yes, at $t = 9$
d) 4

6a) It does not exist because, for example, approaching along the x-axis the function equals 0, so has limit zero as $x \to 0$; while approaching along the line $y = x$, the function is constant equal to 2.
b) $f_{xx} = (48x^9y - 288x^5y^5 + 36xy^9)/(2x^4 + y^4)^3$
$f_{xy} = (-24x^{10} + 264x^6y^4 - 54x^2y^8)/(2x^4 + y^4)^3$
$f_{yx} = (-24x^{10} + 264x^6y^4 - 54x^2y^8)/(2x^4 + y^4)^3$
$f_{yy} = (-240x^7y^3 + 72x^3y^7)/(2x^4 + y^4)^3$
c) $2/3x - 2/3y - z = -2$

Practice Exam 2

1a) $x = 8 - t; \quad y = 7 + 2t; \quad z = 2t$ (there are many other answers)
b) $(13, -3, -10)$

2a) $(1/2, 1/2, 0)$
b) $\sqrt{3}/2$
c) $x + y + z = 1$

3a) $x = 3 - 3t; \quad y = 2 - 3t; \quad z = -1 + 3t$
b) L_1 is at P at $t = -1$. L and L_2 intersect at $(1, 0, 1)$
c) $\sqrt{12}$

4a) $\mathbf{r}(t) = \langle -1/3t^3 + 3t, 2t^2 - 17, 4t - 12\rangle$
b) $x = -6t; \quad y = 1 + 12t; \quad z = 4t$
c) $38/3$

5a) $f(x, y) \approx 1 + 10x$
b) $f(0.1, 2.8) \approx 2$