

MATH 126  
Exam II Review - Solutions

1.  $x = 2t, y = -10 + 7t, z = 6 - 3t$
2.  $x = 6t, y = \frac{1}{3} + 2t, z = \frac{1}{3} - 4t$
3.  $-10x - 2y - 6z = -44$
4.  $10x + 10y - 10z = 0$
5.  $19x + 10y - 17z = 22$
6.  $-16x - 21y + 22z = -49$
7.  $-18x - 27y - 51z = -54$
8.  $(2, 10, 5)$
9. (a)  $y = -\frac{1}{8}(z - 2)^2 + 3$   
(b) a line
10.  $x = 4 + 4t, y = 5 + 15t, z = 2 + 4t$
11.  $(18, 15)$
12.  $t = 6$
13.  $\vec{r}(t) = \langle 3 \cos t, 3 \sin t, 2 - 3 \cos t \rangle$
14.  $t = \frac{1}{4}$
15.  $m = \sqrt{2}$
16.  $\vec{r}(s) = \langle -1 + \frac{5s}{\sqrt{38}}, \frac{2s}{\sqrt{38}}, 2 + \frac{3s}{\sqrt{38}} \rangle$
17. (a)  $\frac{2}{\sqrt{6}}$   
(b)  $t = \pm \frac{1}{\sqrt[6]{2}}$
18.  $a_T = \frac{4t}{\sqrt{4t^2 + 26}}, a_N = \frac{\sqrt{104}}{\sqrt{4t^2 + 26}}$

19. (a) the domain is the half plane above (not including) the line  $y = -x$   
 (b)  $f_{xy}(x, y) = e^y + \frac{1}{(x + y)^2}$
20. (a)  $f_y(x, y) = x^2 + x \cos y + \frac{2y}{x - y^2}$   
 (b)  $f_{xy}(x, y) = 2x + \cos y - \frac{2y}{(x - y^2)^2}$
21.  $f_x = 4x^3y^3 - 3y^2 + 20x^4 + (e^{x^3-x})(3x^2 - 1) \ln y,$   
 $f_{xx} = 12x^2y^3 + 80x^3 + (\ln y)e^{x^3-x}((3x^2 - 1)^2 + 6x),$   
 $f_{xy} = 12x^3y^2 - 6y + e^{x^3-x}(3x^2 - 1)y^{-1}$
22. (a) The level curve consists of the two lines  $y = \pm\sqrt{\frac{2}{3}}x.$   
 (b)  $z = \frac{4}{3}(x - 2) - (y - 1) + 3$   
 (c)  $f(1.9, 1.2) \approx 2.66666.....$
23. (a) The domain is the half-plane below the line  $y = 2x$ , excluding the line  $y = 2x - 1.$   
 (b)  $-2e(x - e) + 5e(y - e) + 3e^2 = z$   
 (c)  $f(3, 3) \approx 24.464536....$
24. The point  $(-2,3)$  is a saddle point, and the point  $(2,3)$  is a local minimum.
25. The glass should have horizontal length 8.0505 meters and vertical length 4.0252 meters. The other dimension of the pool should be 30.85989 meters.
26. The point  $(0,0)$  is a saddle point, and the point  $(1,1)$  is a local maximum.