Answers to Math 241 Final, 1999

Part I:

(1) (a) $\langle 0, 3, -3\rangle$
    (b) 3
    (c) $\pi/4$
    (d) $\langle -3, -6, -6\rangle$

(2) $x + y + z = 3$

(3) (a) $2/\sqrt{5}$
    (b) $\langle -4/5, 3/5\rangle$

(4) 3

(5) (a) -1
    (b) 1

(6) (a) 8
    (b) $16\pi/3$
    (c) $\pi\sqrt{2}/5$

(7) $(0, 0)$, saddle point
    $(-2, 0)$, saddle point
    $(-1, 1/2)$, local minimum
    $(-1, -1/2)$, local maximum

Part II:

(1) There are infinitely many different correct answers.
    One is the plane $x + 2y + z = 4$.

(2) $9/2$

(3) The maximum value is 15 (at $(1, 0)$).
    The minimum value is 2 (at $(1/3, 1/4)$).

(4) $15\pi/9$