Name: ID #: Section #:

Q1) [**4pts**]

(a) Find a unit vector that has the same direction as the vector $8\vec{i} - \vec{j} + 4\vec{k}$.

(b) Describe in words the region in $\mathbb{R}^3$ represented by the inequality $x^2 + y^2 + z^2 > 2z$.

Solution:

Q2) [**3pts**] Find the volume of the parallelepiped with adjacent edges PQ, PR and PS, $P(2, 0, -1)$, $Q(4, 1, 0)$, $R(3, -1, 1)$ and $S(2, -2, 2)$.

Solution:

Q3) [**3pts**] Determine whether the vectors are orthogonal, parallel or neither:

(a) $\vec{u} = \langle -3, 9, 6\rangle, \quad \vec{v} = \langle 4, -12, -8\rangle$

(b) $\vec{u} = \vec{i} - \vec{j} + 2\vec{k}, \quad \vec{v} = 2\vec{i} - \vec{j} + \vec{k}$

(c) $\vec{u} = \langle a, b, c\rangle, \quad \vec{v} = \langle -b, a, 0\rangle,$

Solution:

Name: ID #: Section #:

Q1) [**4pts**]

(a) Find a nonzero vector orthogonal to the plane through the points $P(2, 1, 5)$, $Q(-1, 3, 4)$ and $R(3, 0, 6)$.

(b) Describe in words the region in $\mathbb{R}^3$ represented by the inequality $x^2 + y^2 + z^2 > 2z$.

Solution:

Q2) [**3pts**] If $\vec{a} = \langle 3, 0, -1\rangle$, find a vector $\vec{b}$ such that $\text{comp}_{\vec{a}}\vec{b} = 2$.

Solution:

Q3) [**3pts**] Find the volume of the parallelepiped determined by the vectors $\vec{a} = \langle 6, 3, -1\rangle$, $\vec{b} = \langle 0, 1, 2\rangle$ and $\vec{c} = \langle 4, -2, 5\rangle$.

Solution: