

1.

a)  $-5$

b)  $135^\circ$

c)  $-\frac{5}{\sqrt{10}}$

d)  $\left\langle -\frac{3}{2}, -\frac{1}{2} \right\rangle$

e)  $\vec{u}_1 = \left\langle -\frac{3}{2}, -\frac{1}{2} \right\rangle$  and  $\vec{u}_2 = \left\langle -\frac{1}{2}, \frac{3}{2} \right\rangle$

2. No

3.  $23.58^\circ$ 

4.

a)  $7$

b)  $67.62^\circ$

c)  $\frac{7}{\sqrt{26}}$

d)  $\left\langle -\frac{7}{26}, -\frac{35}{26} \right\rangle$

e)  $\vec{u}_1 = \left\langle -\frac{7}{26}, -\frac{35}{26} \right\rangle$  and  $\vec{u}_2 = \left\langle \frac{85}{26}, -\frac{17}{26} \right\rangle$

5.

a)  $-6$

b)  $105.9^\circ$

c)  $-2$

d)  $\langle 0, -2 \rangle$

e)  $\vec{u}_1 = \langle 0, -2 \rangle$  and  $\vec{u}_2 = \langle 7, 0 \rangle$

6. Yes

7. No

8.  $\vec{u}_1 = \langle -3, 2 \rangle$  and  $\vec{u}_2 = \langle 2, 3 \rangle$

9.  $\vec{u}_1 = \langle 6, 0 \rangle$  and  $\vec{u}_2 = \langle 0, 3 \rangle$

10. Force required to keep wagon from rolling down hill: 6.09 lbs

Force experienced by hill: 49.63 lbs

11. Force required to keep elephant from rolling down ramp: 338.09 lbs

Force experienced by ramp: 725.05 lbs

12.  $7.66^\circ$ 13.  $14.48^\circ$