1. Ship A heads due north from point P at 20 mph. At the same time, ship B heads due east from point Q at 40 mph. Point Q is 10 miles south of point P. How is the distance between ships A and B changing after 1 hour?

2. Bulldozers are moving earth at the rate of 1000 cubic yards per hour onto a conically shaped hill whose height is always equal to its radius. At what rate is the height of the hill increasing when the hill is 20 yards high?
3. A 6 foot tall woman walks at a rate of 5 feet per second away from a lamp which is 20 feet high. At what rate is her shadow lengthening when she is 10 feet from the lamp?

E. Suppose that on a standard analog clock, the hour hand is 5 inches long and the minute hand is 12 inches long. At what rate is the distance between the ends of the hands changing when the hands are positioned to read 3 o’clock? Assume the hands of the clock are spinning continuously and not in discrete increments. (Hint: use the law of cosines)