Skills check (not to turn in):

(a) §14.5: 34

(b) The voltage $V$ (in volts) across a circuit is given by Ohm’s law: $V = IR$, where $I$ is the current (in amps) flowing through the circuit and $R$ is the resistance (in ohms). If we place two circuits, with resistance $R_1$ and $R_2$, in parallel, then their combined resistance $R$ is given by

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

Suppose the current is 2 amps and increasing at 10^{-2} amp/sec and $R_1$ is 3 ohms and increasing at 0.5 ohm/sec, while $R_2$ is 5 ohms and decreasing at 0.1 ohm/sec. Calculate the rate at which the voltage is changing.

SUGGESTION: Use differentials!

Assigned:

1. Consider a valley whose height $h$ in meters is given by $h = \frac{x^2}{10} + \frac{y^2}{10}$, with $x$ and $y$ (and 10!) in meters. Suppose you are hiking through this valley on a trail given by

$$x = 3t \quad y = 2t^2$$

with $t$ in seconds (and where “3” and “2” have appropriate units).

(a) How fast are you climbing (rate of change of $h$) per meter along the trail when $t = 1$?

You may find it helpful to recall that $ds = |d\vec{r}|$.

(b) How fast are you climbing per second when $t = 1$. 