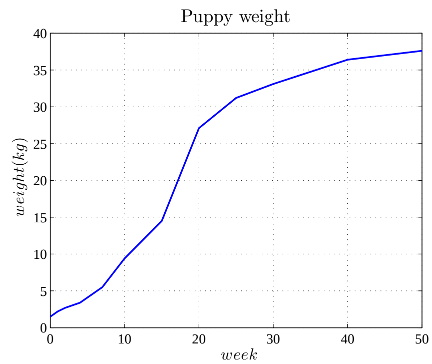
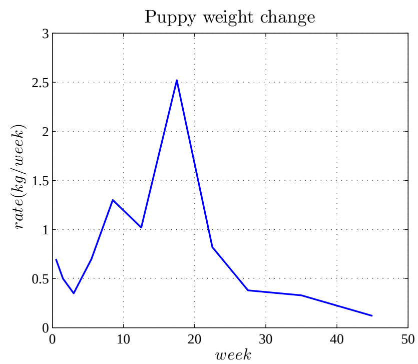
1. a. Between weeks 7 and 10, the data points are $(7, 5.5)$ and $(10, 9.4)$, so the growth rate is $\frac{9.4-5.5}{10-7} = 1.3$ kg/week.

Between weeks 0 and 40, the data points are (0, 1.5) and (40, 36.4), so the growth rate is $\frac{36.4-1.5}{40-0} = 0.8725$ kg/week.

b. A graph of the weight as a function of number of weeks is shown on the left below, with a graph showing the rate of weekly growth as a function of the age below on the right. The maximum rate of growth occurs between weeks 15 and 20. The maximum growth rate is thus between the points $(15, 14.5)$ and $(20, 27.1)$ so $\frac{27.1-14.5}{20-15} = 2.52$ kg/week.





2. a. Suppose the height of a ball satisfies the equation $h(t) = 1700t - 490t^2$, where t is in seconds and $h(t)$ is in cm. The graph of the data is shown below on the left and it forms a parabola. The time of maximum height is when the ball is halfway through its flight, or where $t = \frac{1700}{2 \cdot 490} = 1.735$ sec. The height $h_{max} = h(1.735) = 1700(1.735) - 490(1.735)^2 = 1474.5$ cm. The ball hits the ground where $h(t) = 0 = t(1700 - 490t)$ or $t = 3.469$ secs.

b. The average velocity for $t \in [1, 2]$ is given by $v(1.5) \simeq \frac{1440-1210}{2-1} = 230$ cm/sec.

For $t \in [1,\ 1.1]$, $v(1.05) \simeq \frac{1277.1-1210}{1.1-1} = 671$ cm/sec.

For $t \in [1,\ 1.001]$, $v(1.0005) \simeq \frac{1210.72-1210}{1.001-1} = 719.51$ cm/sec.

The points that are plotted below on the right are (1.5, 230), (1.05, 671) and (1.0005, 720). These points fall on the line $v(t) = 1700 - 980t$.