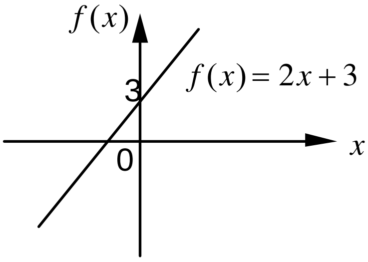
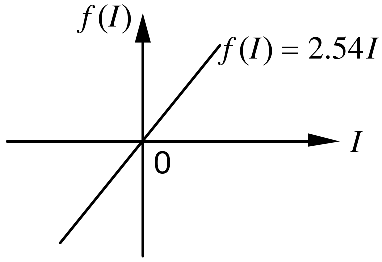
Complete solutions to Exercise 3(c)

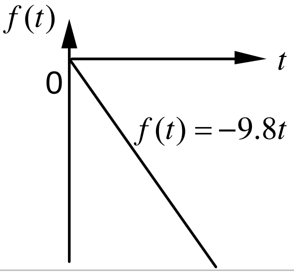
1. (a)



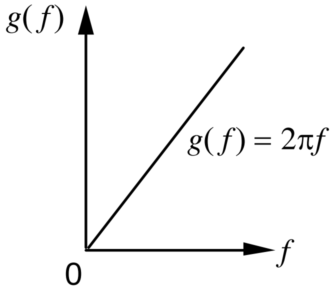
(b)



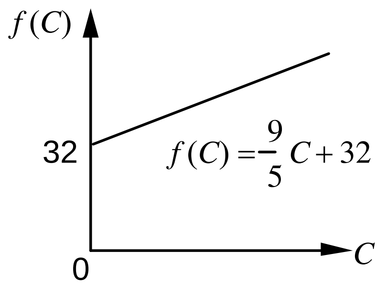
(c)



(d)

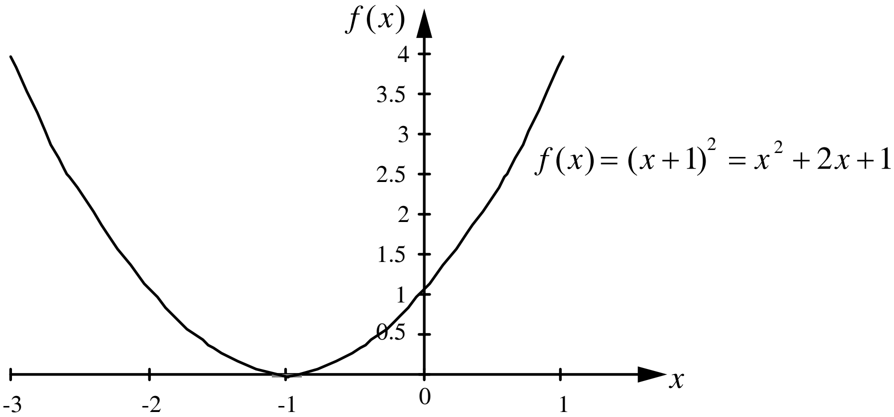


(e)

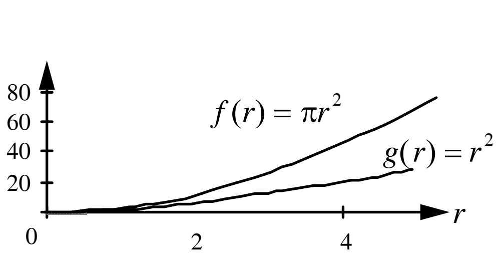


2. Graphs $f(x) = x^2$ and $g(x) = -x^2$ are sketched in Fig 18 of Chapter 2. The graphs are reflections of each other in the horizontal axis.

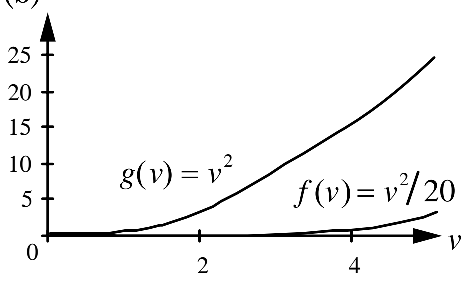
3. Notice that $(x+1)^2 = x^2 + 2x + 1$ (by (1.13)). Therefore (i) and (ii) are the same graphs. The $(x+1)^2$ graph is the same shape as the x^2 graph but it has been shifted to the left by 1 unit, thus:



4. (a)

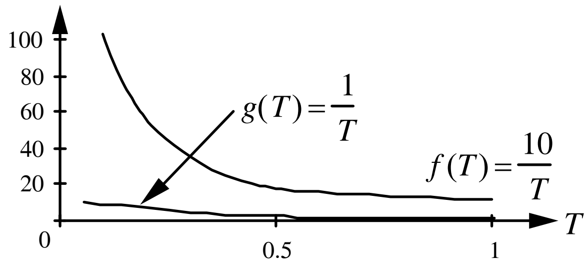


(b)



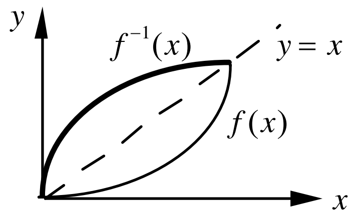
(c)

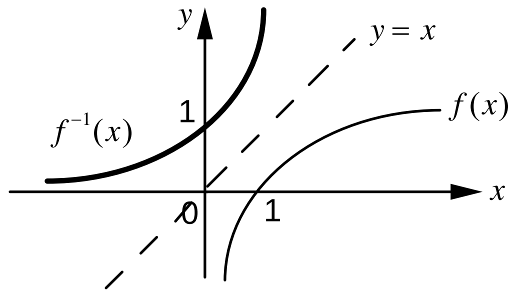
(1.13) $$(a+b)^2 = a^2 + 2ab + b^2$$



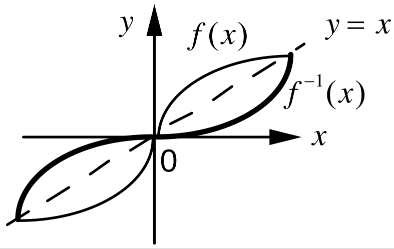
The f graph is a stretch of the g graph (or vice-versa).

5. (a) (b)

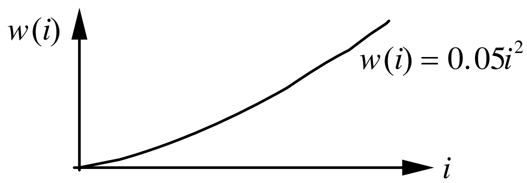




(c)



6. Substituting $L=0.1$ gives $w(i)=\left(\frac{1}{2}\times 0.1\right)i^2=0.05i^2$. Hence the graph:



7. The graph of $2v^2-3$ is similar in shape to the graph of v^2. The v^2 graph is stretched vertically by 2 and shifted down by 3 to give us the $2v^2-3$ graph. Where does $i(v)=2v^2-3$ cross the v axis?

At $i(v)=0$,

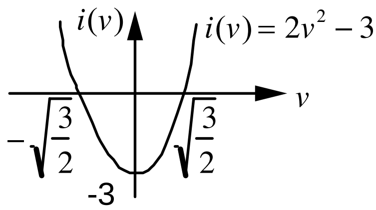
$$2v^2-3=0$$

$$2v^2=3$$

$$v^2=\frac{3}{2}$$

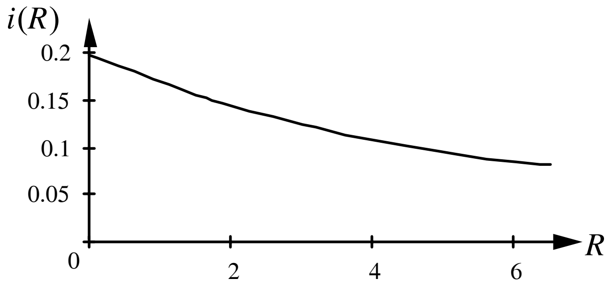
$$v=\sqrt{\frac{3}{2}},\ -\sqrt{\frac{3}{2}}$$

Hence the $2v^2-3$ graph cuts the t axis at $\sqrt{\frac{3}{2}},\ -\sqrt{\frac{3}{2}}$ and the $i(v)$ axis at -3, thus the graph is:



8. The graph of $i(R) = \frac{1}{R+5}$ is similar to the graph of $\frac{1}{R}$. How do we adjust the graph of $\frac{1}{R}$ to sketch $i(R) = \frac{1}{R+5}$?

Shift $\frac{1}{R}$ to the left by 5 units. Thus we have:



9. The graph of $x(t) = (t-1)^3$ is similar in shape to the t^3 graph. How do we adjust the t^3 graph to obtain a sketch of $x(t) = (t-1)^3$?

Shift the graph of t^3 to the right by 1 unit.

For (b) and (c) we stretch the resulting graph, $(t-1)^3$, vertically by a factor of 5 for $5(t-1)^3$ graph and a factor of $\frac{1}{2}$ for $\frac{1}{2}(t-1)^3$ graph.