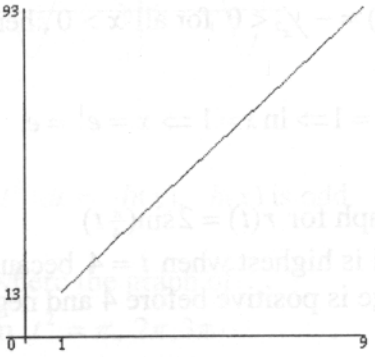
2. The region above interval $[1,9]$ under the graph is a trapezoid, hence the area is $\frac{1}{2}(13+93)(9-1)=424$.



This supports:

$$\int_1^9 (10t+3)dt = (5t^2+3t)\,|_1^9 = (405+27)-(5+3) = 424$$

5. $\int_0^1 e^x dx = (e^x)\,|_0^1 = e^1 - e^0 = e-1.$

6. (a) $\int_{-1}^0 e^{-x} dx = (-e^{-x})\,|_{-1}^0 = -e^0 - (-e^{-(-1)}) = -1+e = e-1.$

These regions are mirror images across the y-axis.

(b) $\int_0^1 e^{-x} dx = (-e^{-x})\,|_0^1 = -e^{-1} - (-e^0) = -\frac{1}{e}+1 = 1-\frac{1}{e}.$

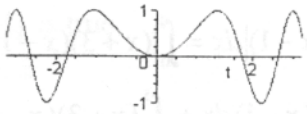
8. (a) Rate of change is negative so it is cooling.

(b) $\int_0^1 -2e^{-t}dt = 2e^{-t}\,|_0^1 = \frac{2}{e}-2$ degrees.

(c) $\int_1^2 -2e^{-t}dt = 2e^{-t}\,|_1^2 = \frac{2}{e^2}-\frac{2}{e}$ degrees.

(d) 100 plus change $= 100 + \frac{2}{e} - 2 = 98 + \frac{2}{e}$ degrees.

13.(a) See graph of $y = \sin(t^2)$ to the right.



(b) $h(x) > 0$ on $(0,\infty)$ as positive signed area always overpowers negative signed area.

(c) $h(-x) = \int_0^{-x} \sin(t^2)dt = -\int_{-x}^0 \sin(t^2)dt =$

- (area of the region reflected across the y-axis) $= -\int_0^x \sin(t^2)dt = -h(x)$, $h(x)$ is odd.

(d) $h(x)$ changes from increasing to decreasing to increasing where the graph of $\sin(t^2)$ crosses the t-axis. That is when $\sin(t^2)=0$, when $t^2 = \pi, 2\pi, 3\pi\cdots$ increasing on $[0,\sqrt{\pi}]$, decreasing on $[\sqrt{\pi},\sqrt{2\pi}]$ and increasing on $[\sqrt{2\pi},3]$.

(e) Maximum = 1 and minimum = -1.

(f) On [0, 3] h as a global min. at 0, a global max. at $\sqrt{\pi}$ and a local min at $\sqrt{2\pi}$. On $(0,\infty)$ 0 is no longer in the interval so we have no global minimum. We still have a global maximum at $\sqrt{\pi}$. There will be infinitely many more local maximum and minimum points. On $(-\infty,\infty)$ the global max is at $\sqrt{\pi}$ and the global min is at $-\sqrt{\pi}$.

(g) $h(\sqrt{\pi}) \cong 0.895$