Part a:

~~$(\log)^n$~~ The runtime of void f_1 would be $\log(\log n)$ because the algorithm is exponentially increasing in an exponential way

~~$\log(n^n) = n\log n$~~

	1	2	3	4	5
Σ	2	4	16	256	65,536
	2^1	2^2	$(2^2)^2$	$((2^2)^2)^2$	$(((2^2)^2)^2)^2$

Part b: outside loop: "$i/\sqrt{n}==0$" give us a run-time of $\sqrt{n}$

~~inside loop~~ inside loop: $\sum_{i=1}^{i^3} 1 = i^3 \quad \theta = n^3$

$$\sum_{i=1}^{n}\theta(1) + \sum_{n=1}^{\sqrt{n}}\theta(n^3) = \theta(n^3\cdot\sqrt{n}) = \theta(n^{\frac{7}{2}})$$

Part c: outer loop i: $\theta = n$

outer loop k: $\theta = n$

for loop: $\theta = \log n$ because it's "$m = m+m$"

total run-time $= \theta(n^2) + \theta(n\log n) = \theta(n^2)$

the if statement runs n^2 times

the inner for loop only runs $n\cdot\log n$

Part d: outer loop (for): $\theta = n \quad \sum_{n=0}^{n-1}\theta(1) = \theta(n)$

first / two lines : $\theta(1)\cdot 2$

1	2	3 --	k
10	$10\cdot\frac{3}{2}$	$10\cdot(\frac{3}{2})^2$ ...	$10(\frac{3}{2})^{k-1}$

$n = 10\cdot(\frac{3}{2})^{k-1}$

$\log_{\frac{3}{2}}(\frac{n}{10}) = k-1$

$k = 1 + \log_{\frac{3}{2}}(\frac{n}{10})$

$k = \theta(\log_{\frac{3}{2}}(\frac{n}{10}))$

total runtime $= \theta(n) + \theta(1) + \sum_{k=1}^{\log_{\frac{3}{2}}(\frac{n}{10})} \theta(10\cdot(\frac{3}{2})^{k-1})$

$= \theta(n) + \theta(1) + \theta(10\cdot(\frac{3}{2})^{\log_{\frac{3}{2}}(\frac{n}{10})-1})$

$= \theta(n) + \theta(1) + \theta(n)$

$= \theta(n)$