Camilo Rivas Cubides

Ejercicios semana 2

1. Ordenar las siguientes funciones de menor a mayor orden:

1. $\log log \ \log log\, n$

2. $\log log\, n$

3. $(\log log\, n)^2$

4. $In\, n$

5. $\sqrt{n}$

6. N

7. $nlog\, n$

8. $n^{1+\varepsilon},\ 0 < \varepsilon < 1$

9. n^2

10. $n^2 + \log log\, n$

11. n^3

12. $n - n^3 + 7n^5$

13. 2^{n-1}

14. 2^n

15. e^n

16. $n!$

2. Para las siguientes funciones, determine el resultado como una función de n y representar el peor caso de ejecución con notación Big Oh:

```
function mystery(n)
  r := 0
  for i := 1 to n - 1 do
    for j := i + 1 to n do
      for k := 1 to j do
        r := r + 1
  return(r)
```

		Costo	Tiempo
		c1	1
		c2	(n-1)
		c3	n(n-1)
		c4	(n)(n)(n-1)
		c5	(n-1)(n-1)(n-1)
		c6	1

$t(n) = c1 + (n-1)c2 + (n^2 - n)c3 + (n^3 - n^2)c4 + (n^3 - 3n^2 + 3n - 1)c5 + c6$

$t(n) = (c4 + c5)n^3 + (c3 - c4 - 3c5)n^2 + (c2 - c3 + 3c5)n + (c1 - c2 - c5 + c6)$

Peor caso: $O(n^3)$

```
function pesky(n)
  r := 0
  for i := 1 to n do
    for j := 1 to i do
      for k := j to i + j do
        r := r + 1
  return(r)
```

		Costo	Tiempo
		c1	1
		c2	n
		c3	(n)(n)
		c4	(2n)(n)(n)
		c5	(n-1)(n-1)(n-1)
		c6	1

$t(n) = c1 + nc2 + n^2c3 + 2n^3c4 + n^3c5 - 3n^2c5 + 3nc5 - c5 + c6$

$t(n) = (2c4 + c5)n^3 + (c3 - 3c5)n^2 + (c2 + 3c5)n + (c1 - c5 + c6)$

peor caso: $(O(n^3))$

```
function prestiferous(n)
  r := 0
  for i := 1 to n do
    for j := 1 to i do
      for k := j to i + j do
        for l := 1 to i + j - k do
          r := r + 1
  return(r)
```

		Costo	Tiempo
		c1	1
		c2	n
		c3	n(n)
		c4	(2n)(n)(n)
		c5	0
		c6	(n-1)(n-1)(n-1)(n-1)
		c7	1

$t(n) = c1 + nc2 + n^2c3 + 2n^3c4 + 0 + n^4c6 - 4n^3c6 + 6n^2c6 - 4nc6 + c6 + c7$

$t(n) = n^4c6 + (2c4 - 4c6)n^3 + (c3 + 6c6)n^2 + (c2 - 4c6)n + (c1 + c6 + c7)$

peor caso: $(O(n^4))$