

Class work: Summations

Find a tight bound for the following summations:

1. $1 + 2 + 3 + \dots + \lg n$

2. $1 + 2 + 3 + 4 + \dots + n^2$

3. $1 + 1/2 + 1/2^2 + \dots + 1/2^n$

4. $1 + 1/5 + 1/5^2 + \dots + 1/5^n$

5. $\frac{9}{10} + \left(\frac{9}{10}\right)^2 + \dots + \left(\frac{9}{10}\right)^n$

6. $\frac{2}{3} + \left(\frac{2}{3}\right)^2 + \dots + \left(\frac{2}{3}\right)^{\lg n}$

7. $1 + 2 + 2^2 + 2^3 + \dots 2^n$

8. $1 + 2 + 2^2 + 2^3 + \dots 2^{n^2}$

9. $n + \frac{n}{2} + \frac{n}{4} + \dots$

10. $n + \frac{2n}{3} + \frac{4n}{9} + \dots$

11. $n + \frac{99n}{100} + \frac{99^2n}{100^2} + \dots$