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Problem 1.

P(x) = 5x^3 − 2x^2 + 3x – 7

P(x) = − 7 + 3x − 2x^2 + 5x^3

P(x) = − 7 + 3x + x(–2x + 5x^2)

P(x) = − 7 + x(3 + x(–2 + 5x))

P(2) = − 7 + 2(3 + 2(–2 + 5\*2))

P(2) = − 7 + 2(3 + 2(8))

P(2) = − 7 + 2(3 + 16)

P(2) = − 7 + 2(19)

P(2) = − 7 + 38

P(2) = 31

3 additions

3 multiplications

Problem 2.

[23, 17, 14, 6, 13, 10, 5, 18]

1. Mergesort

[23, 17], [14, 6], [13, 10], [18, 5] – 4 compares

[23, 17, 14, 6], [18, 13, 10, 5] – 5 compares

[23, 18, 17, 14, 13, 10, 6, 5] – 7 compares

1. Quicksort

[23, 17, 14, 6, 13, 10, 5, {18}] – 1 compare

[5, 17, 14, 6, 13, 10, {18}, 23] – 6 compares

[{23}] – 0 compares

[5, 17, 14, 6, 13, {10}]– 2 compares

[5, 13, 14, 6, {10}, 17]– 1 compare

[5, 6, 14, {10}, 13, 17]– 2 compares

[5, 6, {10}, 14, 13, 17]

[5, {6}] – 1 compare

[{5}] – 0 compares

[14, 13, {17}] – 2 compares

[14, {13}] – 1 compare

[{14}] – 0 compares

1. Heapsort

(23)

(17) (14)

(6) (13) (10) (5)

(18)

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(23)

(17) (14)

(18) (13) (10) (5)

(6)

18 > 6

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(23)

(18) (14)

(17) (13) (10) (5)

(6)

18 > 17

23 > 18

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Problem 3.

T(n) = 2T(n/2) + lg n = Theta (n)

Master theorem:

f(n) = O(n^logb(a)-epsilon) for some constant c > 0, then T(n) = Theta(n^logb(a))

Theta (n^log2(2)) = **Theta (n)**