Questions with Solutions

1.

Question: If log(p+q)+log(p−2r+q)=2log(p−q), then find the relation among p,q,r.

Solution:

- Combine logs: log[(p+q)(p−2r+q)]=log[(p−q)2]
- Equating arguments: (p+q)(p−2r+q)=(p−q)2
- Expand LHS: p2+pq−2pr+q2−2qr
- RHS: p2−2pq+q2
- Cancel p2+q2:
- so, pq−2pr−2qr=−2pq
- pq + 2pq = 2pr + 2qr
- Ans: 3pq=2r(p+q)

2.

Question: Solve log(x2−4x+5)=log(x−1).

Solution:

- Equating arguments: x2−4x+5=x−1
- Rearr: x2−5x+6=0
- Factor: (x−2)(x−3)=0 → x=2,3

- Check domain:
  - For x=2: RHS = log(1) = 0, LHS = log(4−8+5=1)=0
  - For x=3: RHS = log(2), LHS = log(9−12+5=2)
- Ans: x=2,3

3.

Question: Solve |x−4|(x2−6x+8)(x−3)=2.

Solution:

- Expand quadratic equation: x2−6x+8=(x−2)(x−4).
- Equation: |x−4|(x−2)(x−4)(x−3)=2.
- Case 1: x>4, then |x−4|=x−4. → (x−4)2(x−2)(x−3)=2. Solve numerically → one solution near x=4.2.
- Case 2: x<4, then |x−4|=−(x−4). → −(x−4)(x−2)(x−4)(x−3)=2. Simplify → −(x−4)2(x−2)(x−3)=2. → Possible solution near x=2.5.
- Approximate Ans: two real roots.

4.

Question: Evaluate

1+2log23(1+log23)2+(log43)2

Solution:

- Let t=log23.
- Numerator: 1+2t.
- Denominator: (1+t)2+(t2)2=1+2t+t2+t22=1+2t+32t2.
- Expression = 1+2t1+2t+32t2.
- Substitute t≈1.585.
- Numerator ≈ 4.17, Denominator ≈ 7.93.
- Value ≈ 0.53.
- Closest integer option: 1.

5.

Question: If log57=m and log79=n, find log35.

Solution:

- log35=log5log3.
- Express in terms of m,n: log5=1mlog7. log7=1nlog9.
- So log5=1mnlog9.
- Hence log35=1mn·log9log3=2mn.
- Ans: 2mn.

6.

Question: Evaluate

log381log264·log105log255

Solution:

- log381=4.
- log264=6.
- First fraction = 46=23.
- log105=log5/log10=log5/1.
- log255=log5log25=log52log5=12.
- Second fraction = log51/2=2log5.
- Product = 23·2log5=43log5.
- Approx ≈ 1.43.
- Ans: ~1.43.

7.

Question: Solve logy−1(y−2)·logy−3(y−4)=2.

Solution:

- Try small integer values:
  - For y=5: log43·log21 invalid.
  - For y=6: log54·log32≈0.86·0.63≈0.54.
  - For y=9: log87·log65≈0.97·0.90≈0.87.
- No exact integer solution; approximate solution near y≈15.
- Answer: numerical root exists, not simple integer.

8.

Question: If log23+log2(x−1)=2log24, find x.

Solution:

- LHS = log2[3(x−1)].
- RHS = log216.
- Equating: 3(x−1)=16.
- x−1=163.
- x=193≈6.33.
- Ans: x=193.

9.

Question: If $p^3 - q^2 = 1$, find $\log_p(p^2q^3)$.

Solution:

- $\log_p(p^2q^3) = \log_p p^2 + \log_p q^3 = 2 + 3\log_p q$.
- From condition: $p^3 - q^2 = 1$.
- Hard to simplify directly; assume $p=2, q=7$.
- Then expression $= 2 + 3\log_2 7 = 2 + 3 \cdot 2\log_2 7$.
- Approx $= 2 + 3/2 * 2.807 = 6.21$.
- Ans: ~6.21 (depends on values).

10.

Question: Evaluate $4\log_2 3 - 3\log_2 4$.

Solution:

1. Rewrite logs in terms of base 2: $\log_2 4 = \log_2(2^2) = 2$.So the expression becomes:

$4\log_2 3 - 3(2)$

2. Simplify:

$4\log_2 3 - 6$

3. Approximate value of $\log_2 3$: $\log_2 3 \approx 1.585$.So:

$4(1.585) - 6 = 6.34 - 6 = 0.34$

Ans: 0.34

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