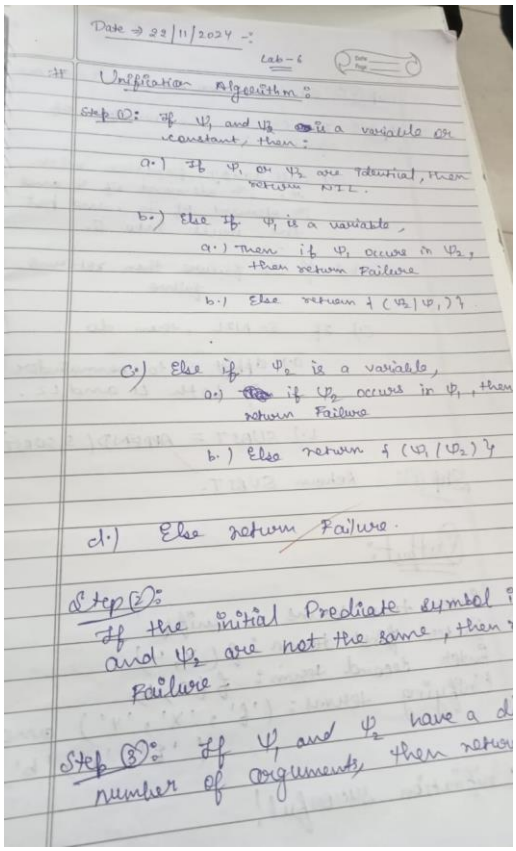
```python
print("Vyom Gupta (1BM22CS333)\n")

def occurs_check(var, term):
    """Check if a variable occurs in a term."""
    if var == term:
        return True
    elif isinstance(term, tuple):  # If the term is a function or a tuple
        return any(occurs_check(var, t) for t in term[1:])
    return False

def unify(term1, term2, substitution=None):
    """Attempt to unify two terms (or predicates)."""
    if substitution is None:
        substitution = {}

    # If both terms are the same, no unification needed
    if term1 == term2:
        return substitution

    # If term1 is a variable, try to unify it with term2
    if isinstance(term1, str) and term1.isupper():
        if term1 in substitution:
            return unify(substitution[term1], term2, substitution)
        if occurs_check(term1, term2):
            return None  # Avoid circular unification (occurs check)
        substitution[term1] = term2
        return substitution

    # If term2 is a variable, try to unify it with term1
    if isinstance(term2, str) and term2.isupper():
```

```python
    if isinstance(term2, str) and term2.isupper():
        return unify(term2, term1, substitution)

    # If both terms are functions or predicates (tuples), unify their components
    if isinstance(term1, tuple) and isinstance(term2, tuple):
        if len(term1) != len(term2):
            return None  # Different number of arguments
        for t1, t2 in zip(term1[1:], term2[1:]):
            substitution = unify(t1, t2, substitution)
            if substitution is None:
                return None  # If any unification fails, return None
        return substitution

    return None  # If no other cases match, return None (failure)

# Example usage
term1 = ('P', 'X', 'a')  # Predicate P(X, a)
term2 = ('P', 'b', 'a')  # Predicate P(b, a)

# Attempt to unify
substitution = unify(term1, term2)
if substitution is not None:
    print("Unification succeeded with substitution:", substitution)
else:
    print("Unification failed")
```

```
Vyom Gupta (1BM22CS333)

Unification succeeded with substitution: {'X': 'b'}


...Program finished with exit code 0
Press ENTER to exit console.
```



Date → 22/11/2024 :-

Lab-6

Unification Algorithm :

Step 0: If Ψ_1 and Ψ_2 is a variable or constant, then :

a.) If Ψ_1 or Ψ_2 are identical, then return NIL.

b.) Else if Ψ_1 is a variable,

a.) then if Ψ_1 occurs in Ψ_2, then return Failure

b.) Else return {(Ψ_2/Ψ_1)}

c.) Else if Ψ_2 is a variable,

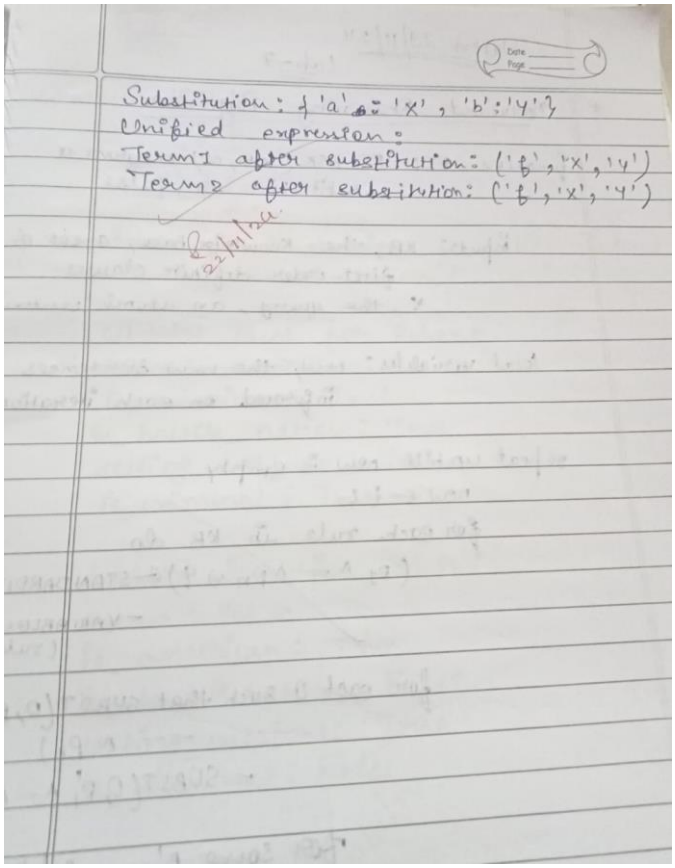
a.) if Ψ_2 occurs in Ψ_1, then return Failure

b.) Else return {(Ψ_1/Ψ_2)}

d.) Else return Failure.

Step (2):
If the initial Predicate symbol in Ψ_1 and Ψ_2 are not the same, then return Failure.

Step (3): If Ψ_1 and Ψ_2 have a different number of arguments, then return



Substitution : {'a' : 'x', 'b' : 'y'}
Unified expression :
Term1 after substitution : ('f', 'x', 'y')
Term2 after substitution : ('f', 'x', 'y')

22/11/24