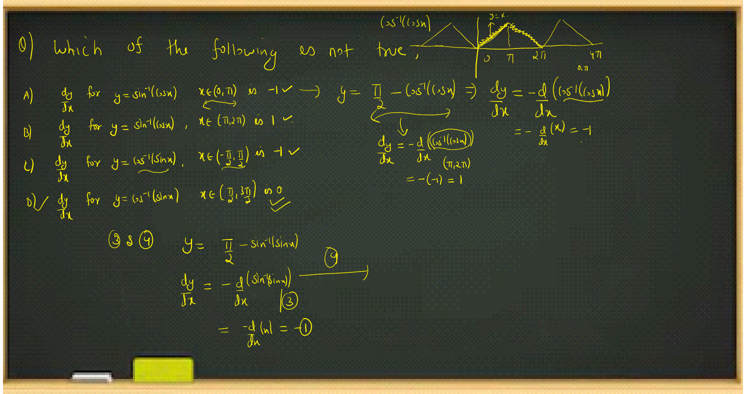
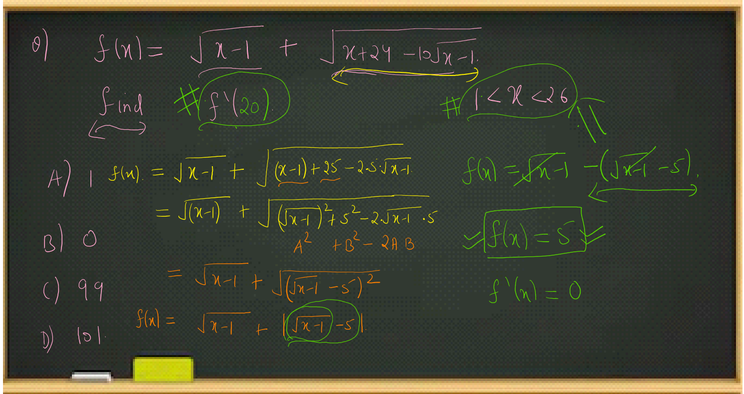
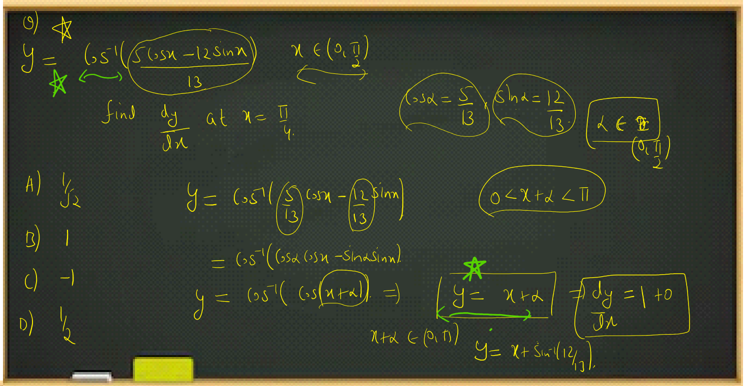
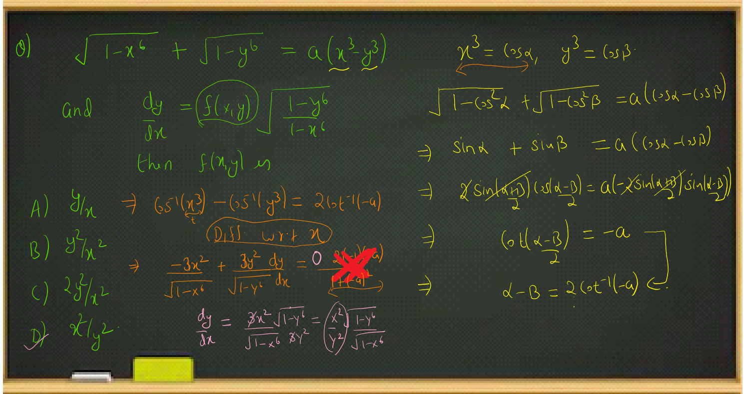
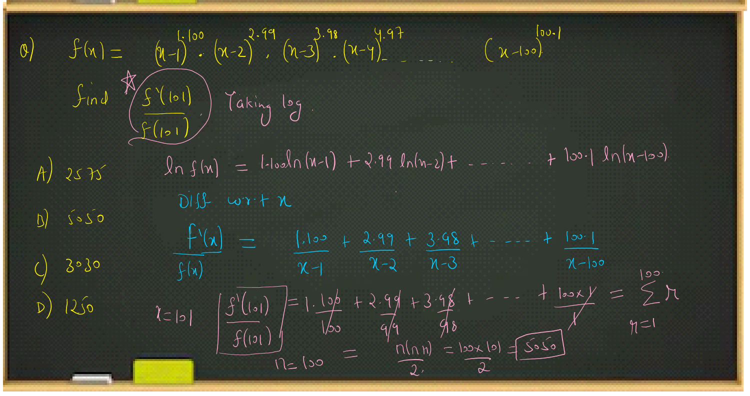
PROBLEMS:

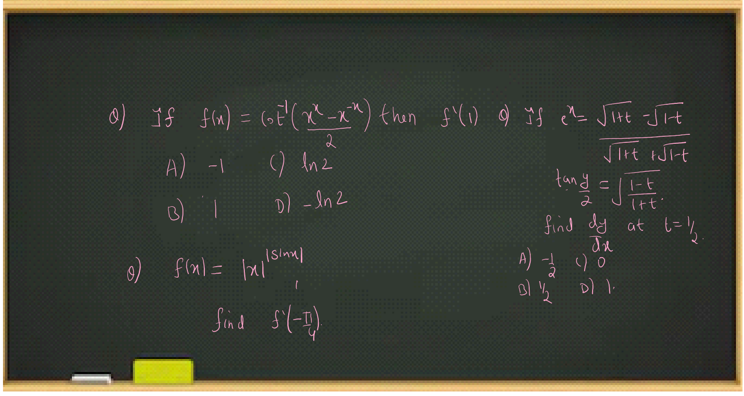

Q) Which of the following is not true,
A) dy/dx for y = sin⁻¹(cos x) x ∈ (0, π) is −1
B) dy/dx for y = sin⁻¹(cos x), x ∈ (π, 2π) is 1
C) dy/dx for y = cos⁻¹(sin x), x ∈ (−π/2, π/2) is −1
D) dy/dx for y = cos⁻¹(sin x) x ∈ (π/2, 3π/2) is 0
y = π/2 − cos⁻¹(cos x) ⇒ dy/dx = −d/dx (cos⁻¹(cos x))
= −d/dx (x) = −1
y = π/2 − sin⁻¹(sin x)
dy/dx = −d/dx (sin⁻¹(sin x))
= −d/dx (x) = −1

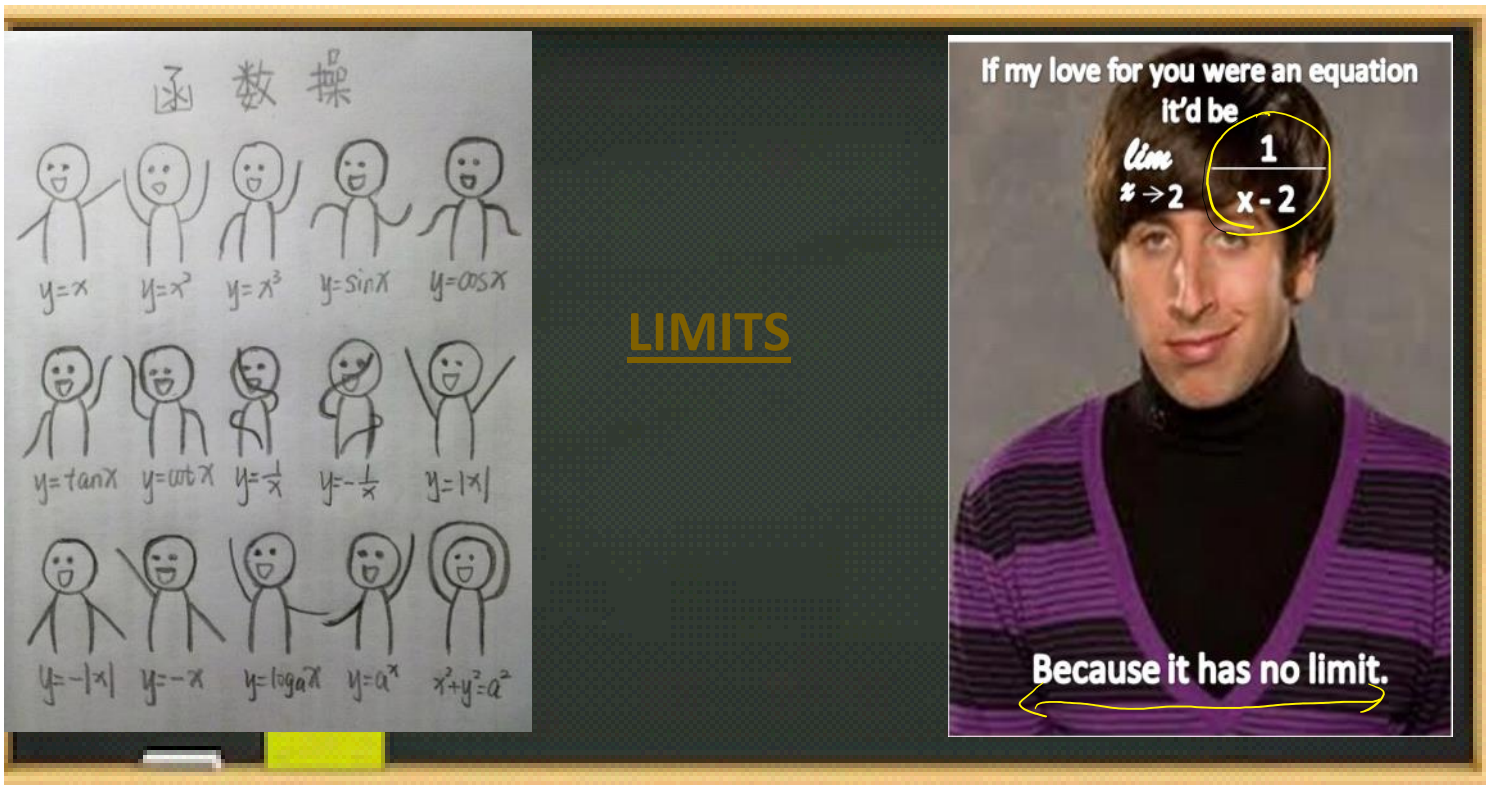

Q) f(x) = √(x−1) + √(x+24 − 10√(x−1))
Find f′(20)
1 < x < 26
A) 1
B) 0
C) 99
D) 101
f(x) = √(x−1) + √((x−1) + 25 − 2·5·√(x−1))
= √(x−1) + √((√(x−1))² + 5² − 2√(x−1)·5)
A² + B² − 2AB
= √(x−1) + √((√(x−1) − 5)²)
f(x) = √(x−1) + |√(x−1) − 5|
f(x) = √(x−1) − (√(x−1) − 5)
f(x) = 5
f′(x) = 0


Q) y = cos⁻¹((5 cos x − 12 sin x)/13) x ∈ (0, π/2)
find dy/dx at x = π/4
A) 1/√2
B) 1
C) −1
D) 1/2
cos α = 5/13, sin α = 12/13
α ∈ (0, π/2)
0 < x + α < π
y = cos⁻¹((5/13) cos x − (12/13) sin x)
= cos⁻¹(cos α cos x − sin α sin x)
y = cos⁻¹(cos(x+α)) ⇒ y = x + α ⇒ dy/dx = 1 + 0
x + α ∈ (0, π)
y = x + sin⁻¹(12/13)


Q) √(1−x⁶) + √(1−y⁶) = a(x³ − y³)
and dy/dx = f(x,y) √((1−y⁶)/(1−x⁶))
then f(x,y) is
A) y/x
B) y²/x²
C) 2y²/x²
D) x²/y²
x³ = cos α, y³ = cos β
√(1−cos²α) + √(1−cos²β) = a(cos α − cos β)
⇒ sin α + sin β = a(cos α − cos β)
⇒ cos⁻¹(x³) − cos⁻¹(y³) = 2 cot⁻¹(−a)
Diff w.r.t x
⇒ −3x²/√(1−x⁶) + 3y²/√(1−y⁶) dy/dx = 0
dy/dx = x²/y² √(1−y⁶)/√(1−x⁶)
⇒ cot((α−β)/2) = −a
⇒ α − β = 2 cot⁻¹(−a)


Q) f(x) = (x−1)^1.100 · (x−2)^2.99 · (x−3)^3.98 · (x−4)^4.97 .... (x−100)^100.1
find f′(101)/f(101)
Taking log
A) 2575
B) 5050
C) 3030
D) 1250
ln f(x) = 1.100 ln(x−1) + 2.99 ln(x−2) + ... + 100.1 ln(x−100)
Diff w.r.t x
f′(x)/f(x) = 1.100/(x−1) + 2.99/(x−2) + 3.98/(x−3) + ... + 100.1/(x−100)
x = 101
f′(101)/f(101) = 1.100/100 + 2.99/99 + 3.98/98 + ... + 100×1/1 = Σ r (r=1 to 100)
n = 100 = n(n+1)/2 = 100×101/2 = 5050


Q) If f(x) = cot⁻¹((xˣ − x⁻ˣ)/2) then f′(1)
A) −1
B) 1
C) ln 2
D) −ln 2
Q) If eˣ = (√(1+t) − √(1−t))/(√(1+t) + √(1−t))
tan(y/2) = √((1−t)/(1+t))
find dy/dx at t = 1/2
A) −1/2
B) 1/2
C) 0
D) 1
Q) f(x) = |x|^|sin x|
find f′(−π/4)


函数操
y=x
y=x²
y=x³
y=sinx
y=cosx
y=tanx
y=cotx
y=1/x
y=-1/x
y=|x|
y=-|x|
y=-x
y=logax
y=aˣ
x²+y²=a²
LIMITS
If my love for you were an equation
it'd be
lim
x→2
1
x - 2
Because it has no limit.

DEFINITION;

Let $\lim_{x \to a} f(x) = l$.

It would mean that when we approach then $x = a$ from the values which are just greater or smaller the $x = a$, $f(x)$ would have a tendency to move closer to the value l.