Name (first and last): _____

UNI: _____

Time in: _____ Time out: _____

INTEGRATION BEE

Qualifying Round

Duration: ONE HOUR

Columbia University February 24, 2023

this qualifying test includes 24 integrals. solve as many integrals as you can in one hour. write the final answer in the space provided. no calculator allowed.

1. $\int x^2\sqrt{1+x^6}\,dx$ Answer: _____.

2. $\int \frac{1}{x^2-x+1}\,dx$ Answer: _____.

3. $\int \frac{x^2-x-9}{x^2-x-6}\,dx$ Answer: _____.

4. $\int \frac{x^3}{1+x^8}\,dx$ Answer: _____.

5. $\int \cos(x)\csc^4(x)\,dx$ Answer: _____.

6. $\int \cos(\sqrt{x})\,dx$ Answer: _____.

7. $\int \sin^3(x) + \cos^3(x)\, dx$ Answer: _____.

8. $\int \dfrac{1}{1+\tan(x)}\, dx$ Answer: _____.

9. $\int \dfrac{1-\cos(x)}{1+\cos(x)}\, dx$ Answer: _____.

10. $\int \arccos^2 x\, dx$ Answer: _____.

11. $\int \dfrac{1}{e^{2x}-1}\, dx$ Answer: _____.

12. $\int \ln^2(x^2)\, dx$ Answer: _____.

13. $\int \dfrac{\arcsin x}{\sqrt{x+1}}\, dx$ Answer: _____.

14. $\int \dfrac{\cos(x)}{\sqrt{\cos(2x)}}\, dx$ Answer: _____.

15. $\int \dfrac{1}{x^3\sqrt{x^2+1}}\, dx$ Answer: _____.

16. $\int \sin(5x)\cos(2x)\,dx$ Answer: _____.

17. $\int \dfrac{dx}{\sqrt{x}+\sqrt[4]{x}}$ Answer: _____.

18. $\int \dfrac{1+x}{1+x^2}\,dx$ Answer: _____.

19. $\int \dfrac{1}{(1+\sqrt{x})^3}\,dx$ Answer: _____.

20. $\int \sqrt{\tan(x)}\,dx$ Answer: _____.

21. $\int \cos(\ln x)\,dx$ Answer: _____.

22. $\int_0^1 \sqrt{1-x^2}dx$ Answer: _____.

23. $\int \dfrac{\ln(3x^2)}{x\ln(x^3)}dx$ Answer: _____.

24. $\int \dfrac{\arctan x}{x^2}dx$ Answer: _____.