Calc AB: Integrals Review

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Name: _____ Date: _____ Score: / 23

DIRECTIONS *Evaluate each integral using u-substitution, trig identities, or the FTC as needed. For #17-20, integrate or evaluate at the given point. For #21-23, factor and simplify before evaluating the limit.*

1 Evaluate:

$$\int_2^4 \frac{15x-3}{5x}\,dx$$

Answer: _____

2 Evaluate:

$$\int_0^1 x^6(4x^2+x-5)\,dx$$

Answer: _____

3 Evaluate:

$$\int 4\sin^2 x\,dx$$

Answer: _____

4 Evaluate:

$$\int_3^4 \frac{3x}{x^2-2}\,dx$$

Answer: _____

5 Evaluate:

$$\int \frac{x^2}{1-x}\,dx$$

Answer: _____

6 Evaluate:

$$\int \frac{7}{e^{5x}}\,dx$$

Answer: _____

7 Evaluate:

$$\int \cos^3(7x)\,dx$$

Answer: _____

8 Evaluate:

$$\int \cos^5 x \sin x\,dx$$

Answer: _____

9 Evaluate:

$$\int_{\ln 2}^{\ln 9} 4e^x\,dx$$

Answer: _____

10 Evaluate:

$$\int_4^{25} \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$$

Answer: _____

11 Evaluate:

$$\int_{1/\sqrt{3}}^1 \frac{dx}{1+x^2}$$

Answer: _____

12 Evaluate:

$$\int \cos(3-2x)\,dx$$

Answer: _____

13 Evaluate:

$$\int \frac{\ln^2 x}{x}\,dx$$

Answer: _____

14 Evaluate:

$$\int \frac{3x}{(x^2+1)^4}\,dx$$

Answer: _____

15 Evaluate:

$$\int \frac{3t-t^2}{2t}\,dt$$

Answer: _____

16 Evaluate:

$$\int \cos^3 2u \sin 2u\,du$$

Answer: _____

17 Find the antiderivative of:

$$\frac{2\cos x}{\sin^2 x}$$

Answer: _____

18 Given f'(x) and f(1)=2, find f(x):

$$f'(x) = \frac{1}{2}x^2 + \frac{3}{4}x$$

Answer: _____

19 Given f'(x) and f(1)=6, find f(2):

$$f'(x) = 5x^4 - 2x$$

Answer: _____

20 Simplify:

$$e^{2\ln x^3}$$

Answer: _____

21 Evaluate the limit:

$$\lim_{x\to 4} \frac{x^2-4}{x^2-16}$$

Answer: _____

22 Evaluate the limit:

$$\lim_{x\to 6} \frac{x-6}{x^2-36}$$

Answer: _____

23 Evaluate the limit:

$$\lim_{x\to 4} \frac{x^3-64}{x^2-16}$$

Answer: _____

Answer Key & Solutions

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TEACHER NOTES

#1: split fraction, integrate term by term. #5: long division first. #10: u=sqrt(x). #11: arctan; bounds 1/sqrt(3) -> pi/6, 1 -> pi/4. #18: integrate f'(x), use f(1)=2 to find C=35/24. #19: f(x)=x^5-x^2+6; f(2)=32-4+6=34. #21: num->12, den->0; DNE. #22-23: factor and cancel.

1 Evaluate:

$\int_2^4 \frac{15x-3}{5x}\,dx$

$= 6-\frac{3}{5}\ln 2$

2 Evaluate:

$\int_0^1 x^6(4x^2+x-5)\,dx$

$= -\frac{73}{504}$

3 Evaluate:

$\int 4\sin^2 x\,dx$

$= 2x-\sin 2x+C$

4 Evaluate:

$\int_3^4 \frac{3x}{x^2-2}\,dx$

$= \frac{3}{2}\ln 2$

5 Evaluate:

$\int \frac{x^2}{1-x}\,dx$

$= -\frac{x^2}{2}-x-\ln|x-1|+C$

6 Evaluate:

$\int \frac{7}{e^{5x}}\,dx$

$= -\frac{7}{5}e^{-5x}+C$

7 Evaluate:

$\int \cos^3(7x)\,dx$

$= \frac{1}{7}\sin 7x-\frac{1}{21}\sin^3 7x+C$

8 Evaluate:

$\int \cos^5 x\sin x\,dx$

$= -\frac{1}{6}\cos^6 x+C$

9 Evaluate:

$\int_{\ln 2}^{\ln 9} 4e^x\,dx$

$= 28$

10 Evaluate:

$\int_4^{25} \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$

$= 2(e^5-e^2)$

11 Evaluate:

$\int_{1/\sqrt{3}}^1 \frac{dx}{1+x^2}$

$= \frac{\pi}{12}$

12 Evaluate:

$\int \cos(3-2x)\,dx$

$= -\frac{1}{2}\sin(3-2x)+C$

13 Evaluate:

$\int \frac{\ln^2 x}{x}\,dx$

$= \frac{1}{3}(\ln x)^3+C$

14 Evaluate:

$\int \frac{3x}{(x^2+1)^4}\,dx$

$= -\frac{1}{2(x^2+1)^3}+C$

15 Evaluate:

$\int \frac{3t-t^2}{2t}\,dt$

$= \frac{3}{2}t-\frac{1}{4}t^2+C$

16 Evaluate:

$\int \cos^3 2u\sin 2u\,du$

$= -\frac{1}{8}\cos^4 2u+C$

17 Find the antiderivative of:

$\frac{2\cos x}{\sin^2 x}$

$= -2\csc x+C$

18 Given f'(x) and f(1)=2, find f(x):

$f'(x)=\frac{1}{2}x^2+\frac{3}{4}x$

$= \frac{x^3}{6}+\frac{3}{8}x^2+\frac{35}{24}$

19 Given f'(x) and f(1)=6, find f(2):

$f'(x)=5x^4-2x$

$= f(2)=34$

20 Simplify:

$e^{2\ln x^3}$

$= x^6$

21 Evaluate the limit:

$\lim_{x\to 4}\frac{x^2-4}{x^2-16}$

$=$ DNE

22 Evaluate the limit:

$\lim_{x\to 6}\frac{x-6}{x^2-36}$

$= \frac{1}{12}$

23 Evaluate the limit:

$\lim_{x\to 4}\frac{x^3-64}{x^2-16}$

$= 6$