BC Calculus Name_____Pd.___

Integration: Review Date_____Seat #___

Please start off ever review with reading your notecards for that unit several times!!!! This is a very limited review.

Integration-The problems will be one you can just integrate, use u-substitution, or Integrate by parts.

$\int \sin(u)\,du =$	$\int \sec^2(u)\,du =$	$\int \sec(u)\tan(u)\,du =$
$\int \cos(u)\,du =$	$\int \csc^2(u)\,du =$	$\int \csc(u)\cot(u)\,du =$
$\int \tan(u)\,du =$	$\int \cot(u)\,du =$	$\int \csc(u)\,du =$
$\int \frac{1}{u}\,du =$	$\int b^u\,du =$	$\int \sec(u)\,du =$
$\int \frac{1}{\sqrt{1-u^2}}\,du =$	$\int \frac{1}{1+u^2}\,du =$	$\int \frac{1}{\lvert u\rvert\sqrt{u^2-1}}\,du =$
$\int e^u\,du$	$\int \ln(u)\,du$	$\int \log_b(u)\,du$
$\int \sin^{-1}(u)\,du$	$\int \tan^{-1}(u)\,du$	$\int \sec^{-1}(u)\,du$

$\int \frac{\text{small top}}{\text{larger factorable bottom}}$ $\int \frac{\text{large top}}{\text{small bottom}}$

Integration by parts- $\int u \cdot dv =$ (ILATE)

I- **L-** **A-** **T-** **E-**

$\cos^2 x =$ $\sin^2 x =$

Improper Integral-are integral with one of your limits as infinity, limits that are not in the domain of the function, or limits that are defined but the function is undefined in the middle of the limits. You rewrite improper integrals as limits.

$\int_{\#}^{\infty} f(x)\,dx =$ $\int_a^b f(x)\,dx =$ b in not in domain $\int_a^c f(x)\,dx =$ b is not in domain

Problems:

1. $\int_0^3 \sqrt{x+1}\,dx$
   a.) $\frac{21}{2}$
   b.) 7
   c.) $\frac{16}{3}$
   d.) $\frac{14}{3}$
   e.) $-\frac{1}{4}$

2. $\int_1^2 x^{-3}\,dx$
   a.) $-\frac{7}{8}$
   b.) $-\frac{3}{4}$
   c.) $\frac{15}{64}$
   d.) $\frac{3}{8}$
   e.) $\frac{15}{16}$

Key: 1-D 2-D 3-E 4-D 5-A 6-B 7-D 8-D 9-D 10-E 11-A 12-A 13-A 14-B 15-A 16-C 17-D 18-A 19-D 20-C 21-D 22-B 23-D

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3. $\int_0^{\frac{1}{2}} \frac{2x}{\sqrt{1-x^2}}\,dx$

a.) $1-\frac{\sqrt{3}}{2}$
b.) $\frac{1}{2}\ln\frac{3}{4}$
c.) $\frac{\pi}{6}$
d.) $\frac{\pi}{6}-1$
e.) $2-\sqrt{3}$

4. $\int_0^{\frac{\pi}{4}} \tan^2 x\,dx$

a.) $\frac{\pi}{4}-1$
b.) $1-\frac{\pi}{4}$
c.) $\frac{1}{3}$
d.) $\sqrt{2}-1$
e.) $\frac{\pi}{4}+1$

5. $\int x\cos(2x)\,dx$

a.) $\frac{x\sin(2x)}{2}+\frac{\cos(2x)}{4}+C$
b.) $\frac{x\sin(2x)}{2}+\frac{\cos(4x)}{2}+C$
c.) $\frac{x^2\cos(2x)}{2}-\frac{x^2\sin(2x)}{4}+C$
d.) $\frac{x^2\sin(2x)}{4}+C$
e.) $\sin(x^2)+C$

6. $\int x^4\cos(x^5)\,dx$

a.) $\frac{\sin(x^5)}{4}+C$
b.) $\frac{\sin(x^5)}{5}+C$
c.) $\sin(x^5)+C$
d.) $\frac{\cos(x^5)}{5}+C$
e.) $\frac{\sin(U)}{5}+C$

7. $\int_0^8 \frac{dx}{\sqrt{1+x}}$

a.) 1
b.) $\frac{3}{2}$
c.) 2
d.) 4
e.) 6

8. $\int \sin(2x+3)\,dx$

a.) $\frac{\cos(2x+3)}{2}+C$
b.) $\cos(2x+3)+C$
c.) $-\cos(2x+3)+C$
d.) $-\frac{\cos(2x+3)}{2}+C$
e.) $-\frac{\cos(2x+3)}{5}+C$

9. Assume $f(x)$ is a differentiable function. Which of the following expressions is equal to $\int x^3 f'(x)\,dx$?

a.) $x^3f(x)-\int\frac{1}{4}x^4f(x)\,dx$
b.) $\frac{1}{4}x^4f(x)+C$
c.) $x^3f''(x)-\int 3x^2f(x)\,dx$
d.) $x^3f(x)-\int 3x^2f(x)\,dx$
e.) $3x^2f(x)-\int x^3f(x)\,dx$

10. $\int\left(x^3-3x\right)dx$

a.) $3x^2-3+C$
b.) $4x^4-6x^2+C$
c.) $\frac{x^4}{3}-3x^2+C$
d.) $\frac{x^4}{4}-3x+C$
e.) $\frac{x^4}{4}-\frac{3x^2}{2}+C$

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Practice:

11. According to the methods of partial fractions, there is an equation of the form $\frac{x}{(x-1)(x-2)(x-3)} = \frac{A}{x-1} + \frac{B}{x-2} + \frac{C}{x-3}$ for some numbers A, B, & C. What is the number B?

a.) -2
b.) $\frac{1}{2}$
c.) -1
d.) 3
e.) 0

12. $\int_0^{\frac{\pi}{2}} \sin^2 x \cos^5 x \, dx$

a.) $\frac{1}{3} - \frac{2}{5} + \frac{1}{7}$
b.) $\frac{1}{6}$
c.) $\frac{1}{5} + \frac{4}{7} - \frac{1}{9}$
d.) $1 - \frac{2}{3} + \frac{1}{5}$
e.) 0

13. $\int_2^{\infty} \frac{2}{x^2} dx$

a.) 1
b.) 0
c.) -1
d.) -2
e.) doesnot exist

14. $\int x^2 + 7 \, dx$

a.) $2x + C$
b.) $x^3 + 7x + C$
c.) $\frac{1}{2}x^3 + 7x + C$
d.) $\frac{1}{3}x^3 + 7x + C$

15. $\int_1^2 t^2 \ln(t) dt$

a.) $\frac{8}{3}\ln(2) - \frac{7}{9}$
b.) $4\ln(2) + 1$
c.) $\frac{9}{2}\ln(2) - \frac{7}{2}$
d.) $3\ln(2) + \frac{2}{9}$
e.) $4(\ln 2)^2$

16. $\int \frac{x}{x^2 - 4} dx$

a.) $\frac{-1}{4(x^2-4)^2} + C$
b.) $\frac{-1}{2(x^2-4)^2} + C$
c.) $\frac{1}{2}\ln|x^2 - 4| + C$
d.) $2\ln|x^2 - 4| + C$
e.) $\frac{1}{2}\arctan\left(\frac{x}{2}\right) + C$

17. $\int \frac{2x}{(x+2)(x+1)} dx =$

a.) $\ln|x+2| + \ln|x+1| + C$
b.) $\ln|x+2| + \ln|x+1| - 3x + C$
c.) $-4\ln|x+2| + 2\ln|x+1| + C$
d.) $4\ln|x+2| - 2\ln|x+1| + C$
e.) $2\ln|x| + \frac{2}{3}x + \frac{1}{2}x^2 + C$

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18. $\int (3x+1)^5\,dx =$

a.) $\frac{(3x+1)^6}{18}+C$

b.) $\frac{(3x+1)^6}{2}+C$

c.) $\frac{3x^2}{2}+x+C$

d.) $\frac{(3x+1)^6}{6}+C$

e.) $\frac{\left(\frac{3x^2}{2}+x\right)^6}{2}+C$

19. Given $f(x)=\begin{cases} x+1 & \text{for } x<0 \\ \cos(\pi x) & \text{for } x\geq 0 \end{cases}$

$\int_{-1}^{1} f(x)\,dx =$

a.) $\frac{1}{2}+\frac{1}{\pi}$

b.) $-\frac{1}{2}$

c.) $\frac{1}{2}-\frac{1}{\pi}$

d.) $\frac{1}{2}$

e.) $-\frac{1}{2}+\pi$

20. $\int_0^{\infty} \frac{3x^2}{\left(1+x^3\right)^2}\,dx$

a.) -1
b.) 0
c.) 1
d.) 3
e.) nonexistent

21. $\int \csc x\,dx$

a.) $-\cot x+C$
b.) $-\cot^2 x+C$
c.) $-\csc x\cot x+C$
d.) $\ln\left|\csc x-\cot x\right|+C$
e.) $\ln\left|\cot x-\csc x\right|+C$

22. $\int_0^1 xe^x\,dx$

a.) 0
b.) 1
c.) e
d.) $2e-1$
e.) none of these

23. $\int_0^1 e^{-4x}\,dx =$

a.) $\frac{-e^{-4}}{4}$

b.) $-4e^{-4}$

c.) $e^{-4}-1$

d.) $\frac{1}{4}-\frac{e^{-4}}{4}$

e.) $4-4e^{-4}$