MATH 2414 EXAM I
SUMMER 2020 EGLEY

WRITE THE CORRECT RESPONSE IN THE BLANK SPACE ON YOUR ANSWER SHEET.
FOR THE MULTIPLE CHOICE, **USE ONLY CAPITAL LETTERS**. FOR THE ITEMS INDICATED AS SHORT ANSWER, WRITE YOUR RESULT IN THE BLANK SPACE.

YOU MAY USE A CALCULATOR, YOUR NOTES, AND THE TEXTBOOK.

YOU MUST SUBMIT A PIC OF ALL YOUR ANSWER SHEETS NO LATER THAN TODAY AT 12:15pm.

I. MULTIPLE CHOICE: WRITE YOUR RESPONSE IN THE SPACE ON THE ANSWER SHEET.
USE ONLY CAPITAL LETTERS.

1. WHICH OF THE FOLLOWING INTEGRALS WOULD REQUIRE INTEGRATION BY PARTS TO EVALUATE?

A. $\int \frac{x^2}{\sqrt{x^2+4}}\,dx$ B. $\int \sec^2(x)\tan^3(x)\,dx$ C. $\int 7x\cos(x)\,dx$

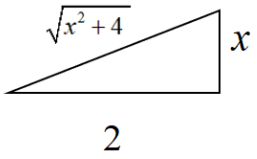
D. ALL OF THESE REQUIRE INTEGRATION BY PARTS E. NONE OF THESE

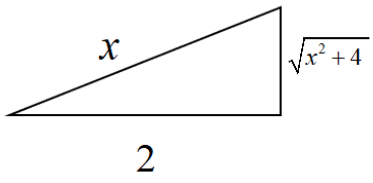
2. WHICH OF THE FOLLOWING INTEGRALS WOULD REQUIRE PARTIAL FRACTIONS TO EVALUATE?

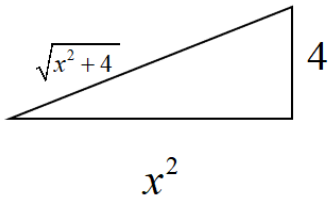
A. $\int \frac{x^2}{\sqrt{x^2+4}}\,dx$ B. $\int \sec^2(x)\tan^3(x)\,dx$ C. $\int 7x\cos(x)\,dx$

D. ALL OF THESE REQUIRE PARTIAL FRACTIONS E. NONE OF THESE

3. WHEN EVALUATING THE INTEGRAL $\int \frac{x^3}{\sqrt{x^2+4}}\,dx$ USING TRIGONOMETRIC SUBSTITUTION WHICH OF THE FOLLOWING TRIANGLES IS CORRECTLY LABELED FOR THIS INTEGRAL?

A. 

B. 

C. 

D. ALL OF THESE ARE CORRECT E. NONE OF THESE

4. WHEN EVALUATING THE INTEGRAL $\int \frac{x-2}{(x-3)(x+4)^2}\,dx$ WHAT IS A CORRECT PARTIAL FRACTION CONSTRUCTION?

A. $\frac{A}{(x-3)}+\frac{B}{(x+4)^2}$ B. $\frac{A}{(x-3)}+\frac{(Bx+C)}{(x+4)^2}$ C. $\frac{A}{(x-3)}+\frac{B}{(x+4)}+\frac{C}{(x+4)^2}$

D. $\frac{A}{(x-3)}+\frac{B}{(x+4)}+\frac{(Cx+D)}{(x+4)^2}$ E. NONE OF THESE

CONTINUED ON NEXT PAGE:

5. WHEN EVALUATING THE INTEGRAL $\int 6x\, e^{(-2x)} dx$ USING INTEGRATION BY PARTS WHICH OF THE FOLLOWING IS OBTAINED WHEN COMPILING THE QUANTITY $uv - \int v\, du$?

A. $6xe^{(-2x)} - \int 6e^{(-2x)} du$ B. $6xe^{(-2x)} + \int 6e^{(-2x)} du$ C. $3xe^{(-2x)} - \int 6e^{(-2x)} du$

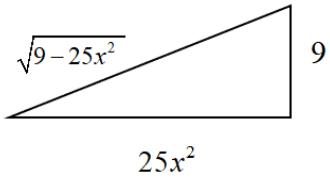
D. $-3xe^{(-2x)} - \int 3e^{(-2x)} du$ E. NONE OF THESE

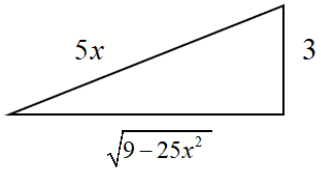
6. WHEN EVALUATING THE INTEGRAL $\int x^2 \sin(x)\, dx$ USING INTEGRATION BY PARTS WHICH OF THE FOLLOWING IS THE MORE VIABLE CHOICE FOR THE VALUE OF dv ?

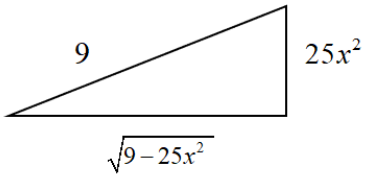
A. $dv = x^2\, dx$ B. $dv = \sin(x)\, dx$ C. $dv = \sin(x)$

D. INTEGRATION BY PARTS CANNOT BE USED FOR THIS E. NONE OF THESE

7. WHEN EVALUATING THE INTEGRAL $\int \frac{1}{x^2\sqrt{9-25x^2}}\, dx$ USING TRIGONOMETRIC SUBSTITUTION WHICH OF THE FOLLOWING TRIANGLES IS CORRECTLY LABELED FOR THIS INTEGRAL?

A. 

B. 

C. 

D. ALL OF THESE ARE CORRECT E. NONE OF THESE

8. WHEN EVALUATING THE TRIGONOMETRIC INTEGRAL $\int \tan^3(x)\sec^3(x)\, dx$ WHICH OF THE FOLLOWING IS AS INTEGRAL WHICH WILL ARRISE IN THAT EVALUATION PROCESS ?

A. $\int \left(\sec^4(x) - 1\right)\underline{\sec(x)\tan(x)}\, dx$ B. $\int \left(\sec^4(x) + \sec^2(x)\right)\underline{\sec(x)\tan(x)}\, dx$

C. $\int \left(\sec^4(x) + 1\right)\underline{\sec(x)\tan(x)}\, dx$ D. $\int \left(\sec^4(x) - \sec^2(x)\right)\underline{\sec(x)\tan(x)}\, dx$

E. NONE OF THESE

9. ASSUME THE VALUE OF THE DEFINITE INTEGRAL $\int_0^{\pi} \sin^2(x)\, dx$ EQUALS $4M$. WHAT IS THE VALUE OF M ?

A. $M = 2\pi$ B. $M = \pi/8$ C. $M = \pi/2$ D. $M = \pi/4$ E. NONE OF THESE

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10. WHAT IS THE LIMIT STATEMENT THAT CORRESPONDS TO EVALUATING THE INTEGRAL $\int_2^{\infty} \frac{2}{\sqrt[3]{x}}\,dx$?

A. $\lim_{b\to\infty}\left[\int_2^{\infty} \frac{2}{\sqrt[3]{x}}\,dx\right]$ B. $\lim_{a\to 2}\left[\int_a^{\infty} \frac{2}{\sqrt[3]{x}}\,dx\right]$ C. $\lim_{b\to\infty}\left[\int_2^{b} \frac{2}{\sqrt[3]{x}}\,dx\right]$

D. NO LIMIT STATEMENT IS REQUIRED E. NONE OF THESE

11. WHICH OF THE FOLLOWING INTEGRALS DIVERGE?

A. NEITHER OF THESE INTEGRALS DIVERGE B. $\int_1^{\infty} \frac{1}{\sqrt[5]{x}}\,dx$ C. $\int_1^{\infty} \frac{1}{x^4}\,dx$

D. NOT ENOUGH INFORMATION IS GIVEN E. NONE OF THESE

12. WHAT IS THE LIMIT STATEMENT THAT CORRESPONDS TO THE IMPROPER INTEGRAL $\int_2^{7} \frac{x^3}{x^2-4}\,dx$?

A. $\lim_{b\to 7^+}\left[\int_2^{b} \frac{x^3}{x^2-4}\,dx\right]$ B. $\lim_{a\to 2^+}\left[\int_a^{7} \frac{x^3}{x^2-4}\,dx\right]$ C. $\lim_{a\to 2^-}\left[\int_a^{7} \frac{x^3}{x^2-4}\,dx\right]$

D. NO LIMIT STATEMENT IS REQUIRED E. NONE OF THESE

13. WHAT IS THE VALUE OF THE INTEGRAL $\int_1^{\infty} \frac{1}{x^3}\,dx$?

A. $1/3$ B. $1/2$ C. $-1/2$ D. NOT ENOUGH INFORMATION IS GIVEN E. NONE OF THESE

14. TO EVALUATING THE INTEGRAL $\int \sin(x)\,e^x dx$ INTEGRATION BY PARTS MUST BE USED TWICE. WHICH OF THE FOLLOWING IS CORRECT FOR THE PARTS GENERATED DURING THE **FIRST** USE OF INTEGRATION BY PARTS?

A. BOTH C AND D ARE VALID B. NEITHER C NOR D ARE VALID

C. $u=\sin(x) \quad v=e^x$
$du=\cos(x)dx \quad dv=e^x dx$

D. $u=e^x \quad v=-\cos(x)$
$du=e^x dx \quad dv=\sin(x)dx$

E. NONE OF THESE

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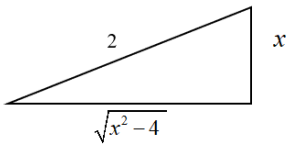
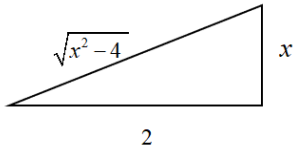
15. WHICH OF THE FOLLOWING INTEGRALS WOULD USE PARTIAL FRACTIONS TO EVALUATE?

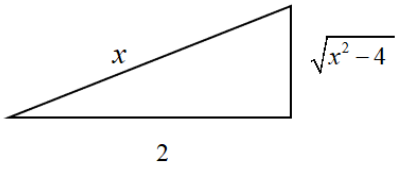
A. ALL OF B, C, AND D USE PARTIAL FRACTIONS B. $\int \frac{x^2}{(x+1)(x^2+4)}\,dx$

C. $\int \frac{x^2}{(x+1)^2(x^2+4)^2}\,dx$ D. $\int \frac{2x^2+4}{x^2(x^2+4)^2}\,dx$ E. NONE OF THESE

16. WHEN EVALUATING THE INTEGRAL $\int \frac{x^4}{\sqrt{x^2-4}}\,dx$ USING TRIGONOMETRIC SUBSTITUTION WHICH OF THE FOLLOWING TRIANGLES IS CORRECTLY LABELED FOR THIS INTEGRAL?

A. 

B. 

C. 

D. ALL OF THESE ARE CORRECT E. NONE OF THESE

17. WHEN EVALUATING THE INTEGRAL $\int \frac{x}{(x^2+1)(x^2+2)^2}\,dx$ WHAT IS A CORRECT PARTIAL FRACTION CONSTRUCTION?

A. $\frac{(Ax+B)}{(x^2+1)}+\frac{(Cx+D)}{(x^2+2)^2}$ B. $\frac{(Ax+B)}{(x^2+1)}+\frac{(Cx+D)}{(x^2+2)}+\frac{(Cx+D)}{(x^2+2)^2}$

C. $\frac{(Ax+B)}{(x^2+1)}+\frac{(Cx+D)}{(x^2+1)^2}+\frac{(Ex+F)}{(x^2+2)}+\frac{(Gx+H)}{(x^2+2)^2}$ D. $\frac{A}{(x^2+1)}+\frac{B}{(x^2+2)^2}$

E. NONE OF THESE

18. WHEN EVALUATING THE INTEGRAL $\int \frac{(x+6)}{x(x+3)}\,dx$ USING THE PARTIAL FRACTION CONSTRUCTION $\frac{(x+6)}{x(x+3)}=\frac{A}{x}+\frac{B}{(x+3)}$ WHAT IS THE VALUE OBTAINED FOR B?

A. $B=2$ B. $B=1$ C. $B=-2$

D. NOT ENOUGH INFORMATION IS GIVEN E. NONE OF THESE

CONTINUED ON NEXT PAGE:

19. WHEN EVALUATING THE TRIGONOMETRIC INTEGRAL $\int \tan^5(x)\sec^4(x)\,dx$ WHICH OF THE FOLLOWING IS AN INTEGRAL WHICH WILL ARRISE IN THAT EVALUATION PROCESS ?

A. $\int \left(\tan^7(x)-1\right)\underbrace{\sec^2(x)}\,dx$ B. $\int \left(\tan^7(x)+\tan^5(x)\right)\underbrace{\sec^2(x)}\,dx$

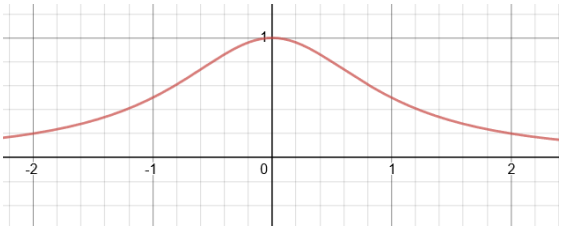
C. $\int \left(\tan^7(x)-\tan^5(x)\right)\underbrace{\sec^2(x)}\,dx$ D. $\int \left(\tan^7(x)+1\right)\underbrace{\sec^2(x)}\,dx$

E. NONE OF THESE

20. WHAT IS THE LIMIT STATEMENT REQUIRED TO EVALUATING THE INTEGRAL

$$\int_0^1 \frac{1}{x^2+1}\,dx\ ?$$

THE GRAPH OF THE FUNCTION IS HERE:



A. $\lim_{b\to 1}\left[\int_0^b \frac{1}{x^2+1}\,dx\right]$ B. $\lim_{a\to 0^+}\left[\int_a^1 \frac{1}{x^2+1}\,dx\right]$ C. $\lim_{b\to 1^-}\left[\int_0^b \frac{1}{x^2+1}\,dx\right]$

D. NO LIMIT STATEMENT IS REQUIRED E. NONE OF THESE

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II. SHORT ANSWER. WRITE OUT YOUR RESPONSE IN THE BLANK ON THE ANSWER SHEET.

21. WHEN EVALUATING THE INTEGRAL $\int \frac{1}{x^3\sqrt{x^2+3}}\,dx$ USING TRIGONOMETRIC SUBSTITUTION,

DRAW AND LABEL THE TRIANGLE TO B E USED TO DETERMINE THE CORRECT SUBSTITUTION. NOTE THAT YOU **DO NOT** NEED TO WORK OUT THE ENTIRE INTEGRAL – JUST DRAW AND LABEL THE TRIANGLE.

22. TO EVALUATE THE INTEGRAL $\int \frac{x^2-2x-1}{(x-4)^3(x^2-3)}\,dx$ USING PARTIAL FRACTIONS,

WRITE OUT THE PARTIAL FRACTION CONSTRUCTION WHICH WOULD BE USED. YOU **DO NOT** NEED TO FIND THE VALUES OF THE COEFFICIENTS, AND YOU **DO NOT** NEED TO WORK OUT THE ENTIRE INTEGRAL. WORK OUT THE ENTIRE INTEGRAL – JUST FIND THE PARTIAL FRACTION CONSTRUCTION WITH THE UNSPECIFIED COEFFICIENTS.

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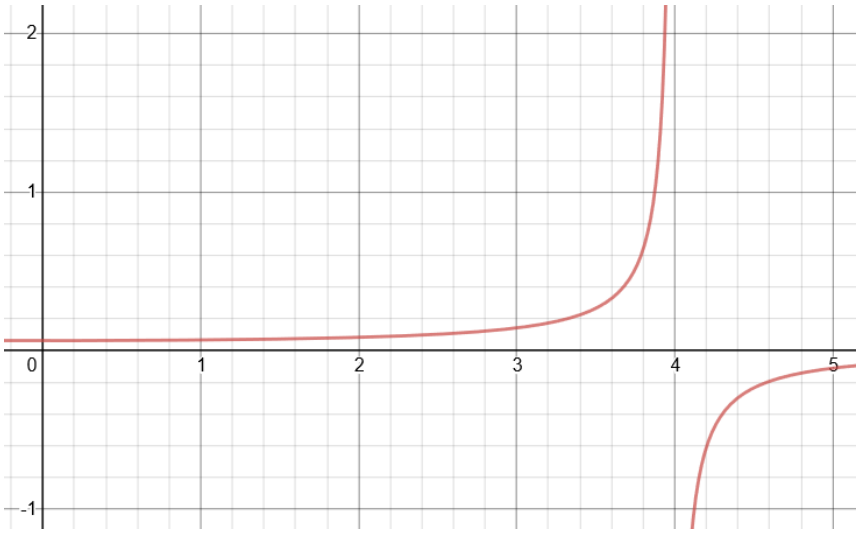
23. TO EVALUATE THE INTEGRAL $\int \tan^{-1}(x)\,dx$ USING INTEGRATION BY PARTS, **WRITE OUT WHAT IS OBTAINED FOR THE EXPRESSION** $uv - \int v\,du$. YOU **DO NOT** NEED TO SIMPLIFY AND YOU **DO NOT** NEED TO WORK OUT THE ENTIRE INTEGRAL JUST DETERMINE THE VALUE OF THE EXPRESSION INDICATED,

24. TO EVALUATE THE IMPROPER INTEGRAL $\int_1^4 \frac{-1}{x^2-16}\,dx$ WRITE OUT THE LIMIT STATMENT WHICH WOULD BE REQUIRED.(YOU NEED **NOT EVALUATE** THE INTEGRAL.)

THE GRAPH OF THE FUNCITON IS HERE



III. FREE RESPONSE: EVALUATE EACH INTEGRAL. SHOW YOUR WORK NEATLY AND COMPLETELY AS DEMONSTRATED IN CLASS. YOU **DO NOT NEED TO SIMPLIFY** YOUR FINAL RESULT IN ANY WAY, HOWEVER, $\boxed{DRAW\ A\ BOX\ AROUND}$ YOUR FINAL ANSWER.

USE AS MANY EXTRA SHEETS AS NEEDED. YOUR WORK MUST BE NEAT, READABLE, AND USE ONLY METHODS DISCUSSED ON THE VIDEO LESSONS.

25. $\int 6xe^{-x}\,dx$ 26. $\int \frac{3x^2+2}{x(x^2+2)}\,dx$ 27. $\int \frac{x^3}{\sqrt{9+x^2}}\,dx$

WHEN YOU ARE FINISHED, **PRINT NEATLY** THE FOLLOWING STATEMENT AT THE BOTTOM OF ONE OF YOUR ANSWER SHEETS THEN **SIGN YOUR NAME**:

ON MY HONOR, I HAVE NEITHER GIVEN NOR RECEIVED IMPROPER ASSISTANCE ON THIS EXAM.