MTH 112 Test 2
Fall 2020

Name ______________________

Calculus II

When finished submit your answers at **https://pryor.mathcs.wilkes.edu/submissions**.
If you feel the answer is none of the choices given, submit no answer to the question.

1. Given $f(x)=\int x\sec x^2\,dx$ and $g(x)=\int x\sec^2 x\,dx$. Which of the following is true?

A. Except for a constant, $f(x) = g(x)$

B. Both $f(x)$ and $g(x)$ are solvable by integration by parts

C. $f(x)$ is solvable by guess, check, and adjust.

D. $f(x)$ is non-integrable.

2. Find $y(1)$ when $yx^2dx = ydx - x^2dy$; $y(2) = e$? **NONE** $e^{\frac{5}{2}}$

A. 0 **B.** $\sqrt{e}$ **C.** $\frac{1}{\sqrt{e}}$ **D.** e^2

3. Decompose $\frac{3x+1}{x^3-2x^2}$ into partial fractions.

A. $\frac{-\frac{7}{4}}{x} - \frac{1}{2x^2} + \frac{\frac{7}{4}}{(x-2)}$

B. $\frac{-\frac{7}{4}}{x} - \frac{1}{x^2} + \frac{7}{(x-2)}$

C. $\frac{1}{2x^2} - \frac{\frac{7}{4}}{(x-2)}$

D. $\frac{\frac{1}{2}}{x^2} + \frac{\frac{7}{4}}{(x-2)}$

4. . We need to find $\int_1^4 x\arctan x\,dx$? find the area under the curve at the right from $x = 1$ to $x = 4$. The proper strategy is to use integration by parts. After the first reduction, what integral remains?

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

C. $-\int \arctan x\,dx$

B. $\frac{1}{2}\int \frac{1}{x^2+1} + 1\,dx$

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

5. In a previous class we mentioned that to integrate $\int \frac{x^2}{x^2-3x-2}\,dx$ using partial fraction decomposition we must realize that the integrand is an improper fraction and that unless we resolve that condition the answer gained by partial fraction decomposition cannot be relied upon. How would the solutions differ if we failed to convert the integrand to a proper fraction? The incorrect solution is missing the term *x*.

6. In order to evaluate $f(x) = \int \frac{2x-5}{4x^2+24x+100}\,dx$ we must split the fraction into two components and then complete the square in the denominator of $-\frac{5}{4}\int \frac{dx}{x^2+6x+25}\,dx$. What would be the denominator in the **final targeted arctangent form** after completing the square? $\left(\frac{1}{4}x + \frac{3}{4}\right)^2 + 1$

7. After the proper substitution of u for x in $\int x\sqrt[3]{8-x}\,dx$, what would be the **simplified integrand** in terms of u ? $3u^6 - 24u^2$ OR $u^{\frac{4}{3}} - 8u^{\frac{1}{3}}$

8. Given the differential equation $xy' + y = y^2$, what is $y(x)$? $y = \dfrac{1}{Cx+1}$

9. In the previous problem, after you separated the variables, what technique was used to integrate with respect to y ?

A. parts

B. partial fraction decomposition

C. change of variable substitution: $u(x)$

D. guess, check, and adjust

10. The power delivered to an electric circuit is given by $P = ei$ where e and i are, respectively, the instantaneous voltage and the instantaneous current in the circuit. The mean power, averaged over a period of time t, is given by $P_{av} = \dfrac{1}{2\pi}\displaystyle\int_0^t ei\,dt$. If $e = 20t$ and $i = 3\sin t$, find the average power over a period from $t = 0$ to $t = \dfrac{\pi}{4}$.

NONE $\dfrac{15}{2}\sqrt{2}\left(1-\dfrac{\pi}{4}\right)$

A. $5\pi\,0$

B. $\dfrac{15}{\pi}$

C. $\dfrac{15}{2\pi}$

D. $3\pi\sqrt{5}$

11. In calculating $\int \ln x\sqrt{x}\,dx$ using integration by parts. What **integrand** remains after the first reduction? $\dfrac{2}{3}\sqrt{x}$

12. To find the length of a curve $y(x)$ from $x = a$ to $x = b$ we use the formula below. Find the length of the curve $y(x) = \ln\cos x$ from $x = 0$ to $x = \dfrac{\pi}{4}$.

$$\mathscr{L} = \int_a^b \sqrt{1+(y')^2}\,dx.$$

$$\mathscr{L} = \frac{1}{2}\ln\left(3+2\sqrt{2}\right)$$