MA 126-103 — Summer 2017 — Dr. Clontz — Readiness Quizzes

1. The Substitution Rule is the opposite of which derivative rule? (2017-06-05, 2.1)
   A. Chain Rule
   B. Product Rule
   C. Quotient Rule
   D. Power Rule

2. What is incorrect about the following attempt at using the Substitution Rule?

$$\int_0^1 (3-2x)^5\,dx = \int_0^1 u^5 \left(-\frac{1}{2}du\right)$$

   (2017-06-05, 2.1)
   A. $dx$ should have been replaced with $+\frac{1}{2}\,du$.
   B. The bounds are incorrect.
   C. $u$ shouldn't be raised to the 5th power.
   D. $dx$ should have been replaced with $-2\,du$.

3. Which of these formulas would be most useful in finding $\int \sin^4\theta \cos^2\theta\,d\theta$? (2017-06-05, 2.2)
   A. $\sin^2(\theta) = \frac{1}{2} + \frac{1}{2}\sin(2\theta)$
   B. $\cos^2(\theta) = 1 - \sin^2(\theta)$
   C. $\sin^2(\theta) = 1 - \cos^2(\theta)$
   D. $\cos^2(\theta) = \frac{1}{2} + \frac{1}{2}\cos(2\theta)$

4. Which of these formulas would be most useful in finding $\int \sec^4(\theta)\,d\theta$? (2017-06-05, 2.2)
   A. $\sec^2(\theta) = 1 - \tan^2(\theta)$
   B. $\tan^2(\theta) = 1 + \sec^2(\theta)$
   C. $\sec^2(\theta) = 1 + \tan^2(\theta)$
   D. $\tan^2(\theta) = 1 - \sec^2(\theta)$

5. Which of these substitutions would be most useful in finding $\int \frac{1}{25x^2+9}\,dx$? (2017-06-05, 2.3)

   A. Let $25x^2 + 9 = 25\sec^2\theta + 25$.

   B. Let $25x^2 + 9 = 9\tan^2\theta + 9$.

   C. Let $25x^2 + 9 = 9\sin^2\theta + 9$.

   D. Let $25x^2 + 9 = 25\cos^2\theta + 25$.

6. Which of these substitutions would be most useful in finding $\int \frac{1}{x\sqrt{4-16x^2}}\,dx$? (2017-06-05, 2.3)

   A. Let $4 - 16x^2 = 16 - 16\cos^2\theta$.

   B. Let $4 - 16x^2 = 4 - 4\sin^2\theta$.

   C. Let $4 - 16x^2 = 4 + 4\tan^2\theta$.

   D. Let $4 - 16x^2 = 16 + 16\sec^2\theta$.

7. Which of these substitutions would be most useful in finding $\int_3^5 \frac{1}{\sqrt{x^2-9}}\,dx$? (2017-06-05, 2.3)

   A. Let $x^2 - 9 = 9\sin^2\theta + 9$.

   B. Let $x^2 - 9 = \tan^2\theta - 1$.

   C. Let $x^2 - 9 = 9\sec^2\theta - 9$.

   D. Let $x^2 - 9 = \cos^2\theta + 1$.

8. Which of these sums is the first step in expanding $\frac{4x^2+16x+17}{(x+2)^2(x^2+1)^2}$ into partial fractions? (2017-06-12, 2.4)

    A. $\frac{A}{x+2} + \frac{Bx}{x+2} + \frac{C}{(x^2+1)^2}$

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

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

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

9. Why must $\frac{3+5x^5}{(x+1)(x+3)^2}$ first be simplifed using long polynomial division before using the method of partial fractions? (2017-06-12, 2.4)

    A. It is a rational function of $x$.

    B. The degree of its numerator is odd, while the degree of its demoninator is even.

    C. It is an irrational function of $x$.

    D. The degree of its numerator is greater than or equal to the degree of its denominator.

10. Integration by Parts is the opposite of which derivative rule? (2017-06-12, 2.5)

    A. Chain Rule

    B. Quotient Rule

    C. Power Rule

    D. Product Rule

11. Which choice is most appropriate for using integration by parts to find $\int 3x\cos(x)\,dx$? (2017-06-12, 2.5)

    A. $u = 3$, $dv = x\cos(x)\,dx$

    B. $u = \cos(x)$, $dv = 3x\,dx$

    C. $u = 3x$, $dv = \cos(x)\,dx$

    D. $u = x\cos(x)$, $dv = 3\,dx$

12. Which of these techniques is most appropriate as the first step to find $\int z^2\sin(z^3)\,dz$? (2017-06-12, 2.6)

    A. Integration by Substitution

    B. Integration by Parts

    C. Method of Partial Fractions

    D. Trigonometric Identities

13. Which of these techniques is most appropriate as the first step to find $\int \frac{t^2+3t+1}{t^3+t}\,dt$? (2017-06-12, 2.6)

    A. Method of Partial Fractions

    B. Trigonometric Substitution

    C. Trigonometric Identities

    D. Integration by Substitution

14. Which of these integrals represents the area bounded by the curves $x = y^2$ and $x = 4$? (2017-06-12, 3.1)

    A. $\int_0^2 2y\,dy$

    B. $\int_{-2}^2 ((4) - (y^2))\,dy$

    C. $\int_0^4 ((\sqrt{y}) - (2))\,dx$

    D. $\int_{-2}^0 ((4y^2) - (2\sqrt{y}))\,dx$

15. Which of these integrals also represents the area bounded by the curves $x = y^2$ and $x = 4$? (2017-06-12, 3.1)

    A. $\int_0^2 ((x^2) - (4))\,dx$

    B. $\int_2^4 ((x^2) - (-x^2))\,dx$

    C. $\int_0^4 ((\sqrt{x}) - (-\sqrt{x}))\,dx$

    D. $\int_2^0 ((x^2) - (\sqrt{x}))\,dx$

16. Let $A(x)$ be the area of the cross-section at $x$ for a solid defined between $a \leq x \leq b$. Which of these integrals gives its volume? (2017-06-19, 3.2)

    A. $\int_b^a (A(x) - a - b)\,dx$

    B. $\int_a^b [A(x)]^2\,dx$

    C. $\int_a^b A(x)\,dx$

    D. $\int_b^a \frac{1}{2}A(x)\,dx$

17. Suppose the cross-sections of a solid defined between $0 \leq x \leq 5$ are triangles with base and height both equal to $x$. Find $A(x)$. (2017-06-19, 3.2)

    A. $\frac{1}{3}bh$

    B. $(x^2 + 5x)$

    C. $\pi x^2$

    D. $\frac{1}{2}x^2$

18. Suppose the cross-sections of a solid are circular washers with outside radius $R(x)$ and inside radius $r(x)$. Which of these gives the area of such a cross-section? (2017-06-19, 3.3)

    A. $A(x) = 2\pi R(x)r(x)$

    B. $A(x) = \pi R(x)r(x)$

    C. $A(x) = 2\pi([R(x)]^2 - [r(x)]^2)$

    D. $A(x) = \pi([R(x)]^2 - [r(x)]^2)$

19. Find the area of a cylindrical shell with radius 4 and height 3. (2017-06-19, 3.4)

    A. $12\pi$

    B. $30\pi$

    C. $6\pi$

    D. $24\pi$

20. In the work integral $\int_a^b F(x)\,dx$, the function $F(x)$ represents... (2017-06-19, 3.5)

    A. Friction

    B. Force

    C. Speed

    D. Mass

21. To calculuate the work done in lifting an unladen swallow, which of the following properties would be most useful to know? (2017-06-19, 3.5)

    A. Airspeed velocity

    B. Weight

    C. Volume

    D. Color

22. Suppose a tank of liquid has its base at height $c$ and its top at height $d$. If $dW$ describes the work required to pump a infintesimal cross-section of liquid at height $y$, which integral gives the work required to completely pump this tank? (2017-06-19, 3.5)

    A. $\int_{y=c}^{y=d} dW$

    B. $\int_{y=c}^{y=d} w^2\,dW$

    C. $\int_{y=c}^{y=d} -\frac{1}{2}y^2\,dW$

    D. $\int_{y=c}^{y=d} y\,dW$

23. The equations $x = 3 + 4\cos(t), y = -2 + 4\sin(t)$ for $0 \leq t \leq 2\pi$ parametrize which kind of curve? (2017-06-26, 4.1)

    A. A parabola

    B. A line segment

    C. A circle oriented counter-clockwise

    D. A circle oriented clockwise

24. The equations $x = 3 + 4t, y = -2 + 4t$ for $0 \leq t \leq 2\pi$ parametrize which kind of curve? (2017-06-26, 4.1)

    A. A parabola

    B. A circle oriented counter-clockwise

    C. A line segment

    D. A circle oriented clockwise

25. The formula $\frac{dy}{dt} = \frac{dy}{dx}\frac{dx}{dt}$ for computing the slope of a tangent line to a curve defined by parametric equations is a result of the... (2017-06-26, 4.2)

    A. Product Rule

    B. Chain Rule

    C. Pythagorean Theorem

    D. Method of Partial Fractions

26. The formula $L = \int_a^b \sqrt{[dx/dt]^2 + [dy/dt]^2}\, dt$ for computing arclength is a result of the... (2017-06-26, 4.2)

    A. Product Rule

    B. Method of Partial Fractions

    C. Chain Rule

    D. Pythagorean Theorem

27. The polar coordinate $(3, \frac{2\pi}{3})$ equals which of the following Cartesian coordinates? (2017-06-26, 4.3)

    A. $(-3\sqrt{3}, 3)$

    B. $(-\frac{3}{2}, \frac{3\sqrt{3}}{2})$

    C. $(3, \frac{3}{2})$

    D. $(-\frac{3}{2}, -3\sqrt{3})$

28. The polar equation $r = 3\sec\theta$ parametrizes which kind of curve? (2017-06-26, 4.3)

    A. A vertical line

    B. A circle

    C. A horizontal line

    D. A cardioid

29. In the polar area formula $\frac{1}{2}\int_{\alpha}^{\beta}((R(\theta))^2 - (r(\theta))^2)\,d\theta$, the greek letter $\beta$ represents which of the following? (2017-06-26, 4.4)

    A. The clockwise-most angle of the region.

    B. The inner-most radius of the region.

    C. The outer-most radius of the region.

    D. The counter-clockwise-most angle of the region.