Readiness Assurance Test

Choose the most appropriate response for each question.

11) Which of the following sets describes where the polynomial $f(x) = x^3(x-1)^2(x+1)$ is **negative**?

    (a) $(-1, 0) \cup (1, \infty)$ (b) $(-\infty, -1) \cup (0, 1)$ (c) $(-1, 0)$ (d) $(0, 1)$

12) Compute $\int \frac{4}{4-x} \, dx$.

    (a) $\ln|4-x| + C$ (b) $-\ln|4-x| + C$ (c) $-4\ln|4-x| + C$ (d) $4\ln|4-x| + C$

13) Compute $\int e^{2x+1} \, dx$

    (a) $\frac{1}{2}e^{2x+1} + C$ (b) $2e^{2x+1} + C$ (c) $e^{2x+1} + C$ (d) $(2x+1)e^{2x+1} + C$

14) Compute $\int xe^{x^2+1} \, dx$.

    (a) $e^{x^2+1} + C$ (b) $xe^{x^2+1} + C$ (c) $\frac{1}{2}e^{x^2+1} + C$ (d) $2e^{x^2+1} + C$

15) Compute $\int x^2 e^x \, dx$.

    (a) $(x^2 - 2x + 2)e^x + C$ (b) $x^2e^x + C$ (c) $2xe^x + C$ (d) $(x^2 - 2)e^x + C$

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

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

17) Compute $\int x\sin(x) \, dx$.

    (a) $-x\cos(x) + C$ (b) $\sin(x) - x\cos(x) + C$ (c) $\frac{1}{2}x^2\cos(x) + C$ (d) $\frac{1}{2}x^2 - \cos(x) + C$

18) Exactly one of the four vector fields below is conservative. Identify which one is conservative.

    (a) $\langle 2xy, y^2 \rangle$ (b) $\langle y^2, 2xy \rangle$ (c) $\langle x^2, 2xy \rangle$ (d) $\langle 2xy, 2xy \rangle$

19) Which of the following is a potential function for the vector field $\langle 2xy + 2, x^2 - 3y^2 \rangle$.

    (a) $xy^2 + 2y + \frac{1}{3}x^3 - 3xy^2$ (b) $x^2y - y^3 + 2x + 3$ (c) $x^2y + 2x + 3$ (d) $x^2y - y^3$

20) Find the general solution to $y' - y = 3 - x$.

    (a) $y = ke^{-x} + x - 1$ (b) $y = ke^{-x} + 2x - 3$ (c) $y = ke^x + x - 2$ (d) $y = ke^x + 3 - x$