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) $y=ke^{x}+3-x$