Readiness Assurance Test

Choose the most appropriate response for each question.

41) Compute $\int xe^x \, dx$

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

42) Compute $\int 4x \ln(x) \, dx$

(a) $2x^2 \ln(x)$ (b) $2x^2 \ln(x) - x^2$ (c) $2x$ (d) $2x^2 - \frac{1}{x}$

43) Compute $\int_0^\infty e^{-t} \, dt$

(a) -1
(b) 0
(c) 1
(d) The integral diverges

44) Compute $\int_0^\infty te^{-t} \, dt$

(a) The integral diverges
(b) 1
(c) 0
(d) -1

45) If $s > 1$ is a real number, compute $\int_0^\infty e^{(1-s)t} \, dt$

(a) e^{1-s} (b) e^{s-1} (c) $\frac{1}{s-1}$ (d) $\frac{1}{1-s}$

46) Which of the following is equivalent to $\frac{1}{x^2-5x+6}$?

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

47) Which of the following is equivalent to $\frac{x}{x^2-5x+6}$?

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

48) Which of the following is equivalent to $\frac{x}{x^2-4x+4}$?

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

49) Which of the following ODEs models the displacement of an **damped** spring-mass sytem?

(a) $x''-4x=0$ (b) $x''+4x=0$ (c) $x''+4x'+4x=0$ (d) $x''-4x'+4x=0$

50) Which of the following ODEs models the displacement of a **undamped** spring-mass sytem?

(a) $x''-4x=0$ (b) $x''+4x=0$ (c) $x''+4x'+4x=0$ (d) $x''-4x'+4x=0$