MS-A0111 PANIC MOMENTS 2021

(1) $\int x^2 e^{-x/2} dx$

(2) (a) $f(x) = x \ln(1+2x)$; Maclaurin of f degree 3 ?

(b) $\lim_{x \to 0} \frac{f(x)}{x^2} = ?$

(3) $\int_0^1 e^{\sqrt{x}} dx$; Use substitution $x = t^2$

(4) Solve $y' = 4\sqrt{y}$, $y(0) = 4$.

(5) Solve $y'' + 7y' + 10y = 130 \sin x$.

Answers:

(1) Integration by parts:

$$I = -e^{-x/2}(16 + 8x + 2x^2)$$

(2) (a) $2x^2 - 2x^3$

(b) 2

(3) 2

(4) $y = 4(1 + 2t + t^2)$

(5) $y = c_1 e^{-5x} + c_2 e^{-2x} - 7\cos x + 9\sin x$

Coverage:

(1) Integration by parts
(2) Taylor & limits
(3) Substitution & by parts
(4) Separable
(5) 2nd order ODE