

Practice Lesson_22_04_20

GROUP I-219ia, 219ib,219ic

1.18. Practice lessons №7. Integration of the equations by Lagrange and Clairaut

Classwork	Answers
<i>Find the solution of the equations:</i>	
7.1. $y = xy' + y'^2$.	$y = Cx + C^2$, singular integral $x^2 + 4y = 0$.
7.2. $y = xy' + \frac{1}{y'}$.	$y = Cx + \frac{1}{C}$, singular integral $y^2 = 4x$.
7.3. $y = xy' + \sin y'$.	$y = Cx + \sin C$, singular solution $y = x(\pi - \arccos x) + \sqrt{1 - x^2}$.
7.4. $y = y'^2(x+1)$.	$y = (\sqrt{x+1} + C)^2$, singular solution $y = 0$.
7.5. $y = yy'^2 + 2xy'$.	$2Cx = C^2 - y^2$, no singular integral.
7.6. $y' = \ln(xy' - y)$.	$y = Cx + e^C$, singular solution $y = x(\ln x - 1)$.
7.7. $y = xy' + a\sqrt[3]{1 - y'^3}$.	$y = Cx + a\sqrt[3]{1 - C^3}$, singular integral $\sqrt[3]{y^3} - \sqrt[3]{x^3} = \sqrt[3]{a^3}$.
Homework	Answers
<i>Find the general and singular solutions of the equations:</i>	
7.6. $y = xy' - 3y'^3$.	$y = Cx - 3C^2$, singular integral $9y \pm 2x\sqrt{x} = 0$.

7.7. $y = xy' + \sqrt{1 + y'^2}$.	$y = Cx + \sqrt{1 + C^2}$, singular integral $x^2 + y^2 = 1$.
7.8. $xy' - y = \ln y'$.	$x = Cx - \ln C$, singular solution $y = \ln x + 1$.
7.9. $2yy' = x(y'^2 + 4)$.	$y = Cx^2 + \frac{1}{C}$, singular integral $y^2 - 4x^2 = 0$.
7.10. $y = x(1 + y') + y'^2$.	$x = Ce^{-p} + 2(1 - p)$ $y = x(1 + p) + p^2$, no singular integral
7.11. $y = y'(x + 1) + y'^2$.	$y = Cx + C + C^2$, singular integral $y = -\frac{1}{4}(x + 1)^2$.
7.12. $x = y\left(\frac{1}{\sqrt{y'}} - \frac{1}{y'}\right)$.	$(C - x)y = C^2$, singular solution $y = 4x$.

1.19. Practical