

Math 256 Problem Set X
Never Due

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= 5th edition page 551 # 14
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6th edition page 610 # 3a),8a),14a)
= 5th edition page 569 # 3,8,14
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Old Exam Problem

A slender homogeneous conducting bar of uniform cross section lies along the x -axis with ends at $x = 0$, $x = L$. The lateral surface of the bar radiates heat into the surroundings at temperature zero. The end $x = 0$ is insulated and at the end $x = L$ there is an inward constant flux q . The initial temperature distribution is $u(x, 0) = f(x)$. Thus

$$\begin{aligned}u_t - \alpha^2 u_{xx} + u &= 0 & 0 < x < L, t > 0 \\u_x(0, t) &= 0 & u_x(L, t) = q & t > 0 \\u(x, 0) &= f(x) & 0 < x < L\end{aligned}$$

Find $u(x, t)$.

Old Exam Problem

A homogeneous solid bar occupies the region $0 \leq x \leq a$, $0 \leq y \leq b$, $0 \leq z \leq c$. There are no heat sources within the bar. The base $z = 0$ is held at 10°C while the remaining sides are held at 0°C . Thus

$$\begin{aligned}\Delta u &= u_{xx} + u_{yy} + u_{zz} = 0 & \text{for } 0 < x < a, 0 < y < b, 0 < z < c \\u(x, 0, z) &= u(x, b, z) = u(0, y, z) = u(a, y, z) = u(x, y, c) = 0 \\u(x, y, 0) &= 10\end{aligned}$$

Find $u(x, y, z)$.

The Final Exam is on Tuesday, April 18 at 8:30 am in OSBO A.