

Homework 11

Chapter 16.

1. $u(1, x) = R e^{-x^2/4\mu}$. $u(1, 0) = R = \text{height of the graph at } x=0$
 plug in R to $u(1, 1) = R e^{-1/4\mu}$ to find μ . ↓ of $u(1, x)$

$u(2, x) = R \frac{1}{\sqrt{2}} e^{-x^2/8\mu}$ $u(2, 0) = R \cdot \frac{1}{\sqrt{2}}$. Solve for R , then plug in to
 $u(2, 1) = R \cdot \frac{1}{\sqrt{2}} e^{-1/8\mu}$ and solve for μ .

3. a) $\sin(\pi x)$, $\cos(\pi x/2)$ (plug in $x=1$ and these are nonnegative)

c) $\sin(\pi x/4)$, $\sin(\pi x/2)$ are nonnegative (plug in $x=3/2$)

4. find α, β s.t. $B(x) = 0$ when $x=0, x=1$

a) $B(x) = \alpha e^{5x} + \beta e^{-5x}$ $B(0) = \alpha + \beta = 0 \Rightarrow \alpha = -\beta$
 $B(1) = \alpha e^5 - \alpha e^{-5} = 0 \Rightarrow \alpha = \beta = 0$

c) $B(x) = \alpha \cos(\pi x) + \beta \sin(\pi x)$ $B(0) = \alpha = 0$
 $B(1) = \beta \sin(\pi) = 0 \Rightarrow \beta = \text{any real number}$

e) $B(x) = \alpha e^{3\pi i x} + \beta e^{-3\pi i x}$ $B(0) = \alpha + \beta = 0 \Rightarrow \alpha = -\beta$
 $B(1) = \alpha e^{3\pi i} + \beta e^{-3\pi i} = \alpha (e^{3\pi i} - e^{-3\pi i}) = 0 \Rightarrow \alpha = \beta = 0$