Homework

p. 349-350

1. advection, diffusion, advection, diffusion

2. a) $\lambda g = \frac{d^2g}{dx^2} - (x^2+1)g$

at the max:

if $g$ has positive max, $g>0$, $\frac{d^2g}{dx^2} \leq 0$, and $-(x^2+1)g < 0$, so $\lambda < 0$

if $g$ has negative min, at the min: $g<0$, $-(x^2+1)g > 0$, $\frac{d^2g}{dx^2} > 0$, so $\lambda < 0$

thus there is no pair $(\lambda, g)$

b) $\lambda g = \frac{d^2g}{dx^2} + (x^2+1)g$

Can't tell with the max principle since the second term is positive at the max and negative at the min.

c) $\lambda g = \frac{d^2g}{dx^2} + \underbrace{(x^2-1)g}_{\text{negative when } 0 \leq x \leq 1}$

So similarly to a) there is no pair $(\lambda, g)$

d) $\lambda g = \frac{d^2g}{dx^2} + (2x^2-1)g$

Can't tell with the max principle since the second term may be positive at the max and negative at the min