

# Homework 16

Due Friday December 5, 2008

- (a) The change in volume of a melting object is proportional to its surface area. The time is 2:22pm, and there are two ice cubes: the first has sides of length 2 cm, and the second has sides of length 1 cm. At 2:30pm, the smaller ice cube has melted entirely: at what time will the larger ice cube disappear?

- (b) Find the general solution to the differential equation

$$f'(x) = \frac{-2}{x+1} f(x).$$

- (c) Find the general solution to the differential equation

$$f'(x) + f(x) = e^x$$

- (d) Find the general solution to the differential equation

$$x f'(x) - 2 f(x) + x = 0.$$

Hint: find an “integrating factor.”

- (e) Find a solution to the wave equation

$$f''(x) = -f(x)$$

with  $f(0) = 1$  and  $f'(0) = 2$ .

- (f) Find the general solution to the differential equation

$$f'''(x) - 6f''(x) + 11f'(x) - 6f(x) = 0.$$