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

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