

Name: \_\_\_\_\_

**Quiz 10**, Section 4.7, due on Mon 16 June

(10 pts) Solve the initial value problem  $x^2y'' - 5xy' + 8y = 0$ ,  $y(2) = 32$ ,  $y'(2) = 0$ .

This is a Cauchy-Euler equation, so the assumed form is  $y = x^m$ . The characteristic equation is  $m(m - 1) - 5m + 8 = 0$ , or  $m^2 - 6m + 8 = 0$ , so  $m = 2, 4$  and  $y_c = c_1x^2 + c_2x^4$ .

Applying the initial conditions yields two equations:

$$32 = 4c_1 + 16c_2$$

$$0 = 4c_1 + 32c_2$$

Subtracting the equations gives  $32 = -16c_2$ , so  $c_2 = -2$  and then  $c_1 = 16$ . The solution is therefore  $y = 16x^2 - 2x^4$ .