

## Written Homework Problems §4.6

15 problems for 30 points

Problems in **red** are optional extra practice.

§4.6 #253, 256, 259, 261, 263, 265, 267, **268**, 272\*, **273\***, 274\*, **277\***, 285

\* You must **justify** your answer.

**Graphing Problems:** For each function below, draw a sophisticated graph without the aid of technology. (When you are done, you should check your answer with technology.) Your analysis should include all important features of the graph including:

- (a) intervals of increase and decrease
- (b) local maxima and minima, if they exist
- (c) intervals of concavity and any inflection points
- (d) any vertical or horizontal asymptotes

All your work should be justified. Note that derivatives for each function have been provided for you.

$$\mathbf{A:} \quad f(x) = \frac{2x^2 - 8}{x^2 - 16}, \quad (f'(x) = \frac{-48x}{(x^2 - 16)^2}, \quad f''(x) = \frac{48(16 + 3x^2)}{(x^2 - 16)^3})$$

$$\mathbf{B:} \quad f(x) = (x - 4)^{2/3}, \quad (f'(x) = \frac{2}{3(x - 4)^{1/3}}, \quad f''(x) = \frac{-2}{9(x - 4)^{4/3}})$$

$$\mathbf{C:} \quad f(x) = e^{-x^2/2} = \frac{1}{e^{x^2/2}}, \quad (f'(x) = \frac{-x}{e^{x^2/2}}, \quad f''(x) = \frac{x^2 - 1}{e^{x^2/2}})$$

$$\mathbf{D:} \quad f(x) = \sqrt{x^2 - 1}, \quad (f'(x) = \frac{x}{\sqrt{x^2 - 1}}, \quad f''(x) = \frac{-1}{(x^2 - 1)^{3/2}})$$

**Problem E:** Let  $f(x) = Ax + e^{-kx}$ , where  $A > 0$  and  $k > 0$ . Find  $f'(x)$  and  $f''(x)$ . Determine intervals of increase or decrease and the locations of any local extrema. Determine intervals of concavity and inflection points.