

## Show Me How To Do The Following

Indicate how confident you are about each of your solutions by filling in one of the circles.

• ○ ○ Very confident      ○ ● ○ Somewhat confident      ○ ○ ● Not confident

1. The total cost and the total revenue (in dollars) for the production and sale of  $x$  hair dryers are given respectively, by

$$C(x) = 5x + 2,340 \text{ and } R(x) = 40x - 0.1x^2, \quad 0 \leq x \leq 400$$

- ○ ○ (a) Find the absolute maximum profit. (Justify)
- ○ ○ (b) Find the marginal revenue at a production level of  $x = 100$  hair dryers and interpret your result.
- ○ ○ (c) Find the exact revenue generated by the production and sale of the 101<sup>st</sup> dryer.
- ○ ○ (d) Should the answers to parts (b) and (c) be nearly the same? (Explain why or why not).

- ○ ○ 2. Consider

$$f(x) = \begin{cases} \frac{x^2 - 1}{x - 1} & , \quad x < 1 \\ 2 & , \quad x = 1 \\ 3x - 1 & , \quad x > 1 \end{cases}$$

Is  $f(x)$  continuous at  $x = 1$ ? You should check all parts of the definition of continuity as part of your answer.

3. The graph of  $y = f'(x)$  is given below:

ooo (a) Find the sign distribution for  $f'(x)$ :

ooo (b) Find the sign distribution for  $f''(x)$ :

ooo (c) Assuming that  $f(0) = 0$ , sketch a possible graph of  $y = f(x)$ .

ooo 4. Find the critical values of  $f(x) = x^3(x - 5)^2$ . Find the sign distribution for  $f'(x)$ .

ooo 5. Find the critical values of  $f(x) = \frac{3x - 1}{4 + 5x}$ . Determine where  $f(x)$  is increasing, and where it is decreasing.

ooo 6. Where is the following function continuous? (show work)  $h(x) = \ln(x^2 - 6x + 8)$

ooo 7. Find the horizontal asymptote (if any) for  $g(x) = \frac{2 - 3x}{1 + 2x}$

ooo 8. I have done most of the work that should allow me to sketch the graph of a rational function. The information that I gathered is listed below, use this information to give a good first sketch of the graph of the function that I was working with.

- The domain of  $f$  is all  $x$  except  $x = 1$  and  $x = -1$ .
- The only  $x$ -intercept is at  $(0, 0)$  (also the  $y$ -intercept)

- $f'(x)$  \_\_\_\_\_

- $f''(x)$  \_\_\_\_\_

- $\lim_{x \rightarrow \infty} f(x) = 0, \quad \lim_{x \rightarrow -\infty} f(x) = 0$

- $\lim_{x \rightarrow 1^-} f(x) = -\infty, \quad \lim_{x \rightarrow 1^+} f(x) = \infty$

- $\lim_{x \rightarrow -1^-} f(x) = -\infty, \quad \lim_{x \rightarrow -1^+} f(x) = \infty$

ooo 9. If  $f(x) = -x^4 + 50x^2$  find the intervals where  $f$  is increasing.

10. Evaluate each of the following integrals:

ooo (a)  $\int 5x^3 - 2x - 7 dx =$

ooo (b)  $\int \frac{x^2 - 3x^4}{x^3} dx =$

ooo (c)  $\int x^2 \sqrt{x^3 + 4} dx =$

ooo (d)  $\int 6x^2(2x^3 - 3)^{20} dx =$

11. We need to fence in a rectangular area next to the store containing  $1600 \text{ ft}^2$  (we put fence on 3 sides). The fence along the side parallel to the building costs \$6 per foot and the two ends each cost \$3 per foot. Find the dimensions that will minimize the total cost. (Justify)
12. Find the absolute maximum and minimum values of  $f(x) = x^{2/3}$  on the interval  $[-3, 2]$ .
13. Circle the correct response (Circle True if the statement is always true):
- (a) TRUE OR FALSE (Circle one).  $f'(x)$  is increasing means that  $f$  is concave up.
  - (b) TRUE OR FALSE (Circle one). If  $f''(2) = 0$ , then  $(2, f(2))$  must be an inflection point on the graph  $y = f(x)$ .
  - (c) TRUE OR FALSE (Circle one).  $\lim_{x \rightarrow -\infty} f(x) = -3$  means that the graph of  $y = f(x)$  has a horizontal asymptote at  $y = -3$ .

SCORE
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