

Math 196L - Andrews, Clark, Laird (Spring 2018)

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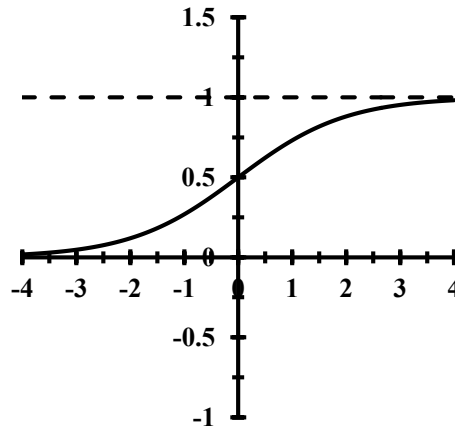
**Problem Set 3 Part 2**

4. A car gets its best mileage at highway speeds. Sketch a plausible qualitative graph of the gas mileage as a function of speed. Determine a reasonable domain and range for the function and justify your reasoning.
5. Oil is spilled from a tanker into the Pacific Ocean. Suppose the area of the oil spill is approximately a circle and that its radius is increasing at a rate of 2.5 miles per hour. Write the area function in terms of the time since the spill occurred.
6. A bird is collecting seed from a field that contains 100 grams of seed. The time in hours it takes to collect  $z$  grams of seed is given by

$$f(z) = \frac{4z + 1}{100 - z} \quad \text{with } 0 < z < 100$$

- (A) Find the inverse function of  $f$
- (B) Find the domain and range of the inverse function.
- (C) Calculate  $f^{-1}(2)$  and give a practical interpretation.
7. Based on data from the Kelley Blue Book, the value  $V$  for a Ford Focus ZX5 hatchback  $t$  years after today can be modeled by the linear model:
- $$V = -1504t + 14,632$$
- (Always in your description include value and the units)
- A) What is the practical interpretation of the number -1504 in the formula?
- B) What is the practical interpretation of the number 14,632 in the formula?
- C) What is the horizontal intercept? And what is the practical interpretation of this value?

8. Use the graph of the function  $y = M(x)$  shown below to answer the following questions.



- Determine the intercepts and asymptotes for the function  $y = M(x)$ .
- Sketch a graph of  $y = M^{-1}(x)$ .
- Determine the intercepts and asymptotes for the function  $y = M^{-1}(x)$ .
- Sketch a graph of  $y = \frac{1}{M(x)}$ .
- Determine the intercepts and asymptotes for the function  $y = \frac{1}{M(x)}$ .

**PART 3:** Getting ready for the exam1.

9. . Let  $f(x) = \sqrt{x-4}$  and  $g(x) = \sqrt{8-x}$ . State the domain of each of the following:

- |                                          |                                     |
|------------------------------------------|-------------------------------------|
| (A) Domain of $f$ : _____                | (B) Domain of $g$ : _____           |
| (C) Domain of $f + g, f - g, fg$ : _____ | (D) Domain of $\frac{f}{g}$ : _____ |
| (E) Domain of $\frac{g}{f}$ : _____      | (F) Domain of $f \circ g$ : _____   |
| (G) Domain of $g \circ f$ : _____        | (H) Domain of $f \circ f$ : _____   |

10. Solve the following inequalities.

a)  $\frac{w-3}{w+5} > 0$

b)  $\frac{t(t-A)}{t+A} \geq 0$  Assume  $A$  is a positive constant.