

MSL Constructed Response Practice Problems

The following problems are similar to problems you will be asked to answer on your final exam for AFM. For each problem, make sure you answer the questions COMPLETELY. Whenever you are asked to EXPLAIN, do so in complete sentences.

1. A geologist is analyzing the erosion of a coastline over the past five years. The table below shows the relationship.

L1	Time (years)	1	2	3	4	5
L2	Cumulative Erosion (feet)	1.01	2.81	6.51	10.14	16.32

r-value  
 ① Stat, Calc, ✓  
 LinReg = .9906  
 ExpReg = .9824  
 Power = .9977  
 (use equation from power reg)

- ① • Does a linear, exponential, or power function best fit the data? Explain. \* Power value closest to 1
- ② • Write the equation of the function that best models the data.
- ③ • Using the equation created, how much erosion can be expected after 8 years? (plug in 8 for x)

\* 2nd, 0 (catalog), Diagnostics ON \*  
 Check to see which r value is closest to 1.

②  $y = 0.9495(x)^{1.7304}$   
 ③  $y = 0.9495(8)^{1.7304} = 34.6898$

2. Use the piecewise function below to answer each question.

$$h(x) = \begin{cases} -2x^2 + 5x + 10 & \text{for } -4 \leq x < 3 \text{ Step 1} \\ 3x + 2 & \text{for } 3 \leq x < 7 \text{ Step 2} \\ \sqrt{2x - 5} & \text{for } 7 \leq x < 16 \text{ Step 3} \end{cases}$$

- ① • What is the range for step 1?
- ② • What is the domain for the entire function?
- ③ • What is  $h(10.5)$ ?

① Range = y-values  
 $-2(-4)^2 + 5(-4) + 10 = -42$   
 $\sqrt{2(16)} - 5 = \sqrt{26}$

②  $[-4, 16)$   
 OR  
 $-4 \leq x < 16$

③  $\sqrt{2(10.5)} - 5 = 4$

$-42 \leq y < \sqrt{26}$  OR  $[-42, \sqrt{26})$

3. Power functions can be written in the form  $f(x) = ax^b$ , where  $b > 1$ .

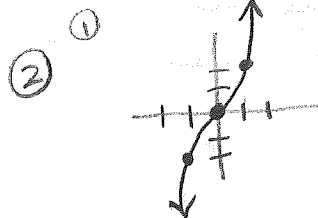
- ① • Write an equation for an odd, positive-integer power function of this form.
- ② • Graph the equation including enough of the domain to show the graph's important features.

(x-intercept, y-intercept, end behavior)

①  $f(x) = 2x^3$   
 $f(x) = 2x^5$   
 $f(x) = 4x^2$

↑  
 $b > 1$

odd



$y = ab^x$   
 ↑  
 $b > 1$   
 b carries the exponent

4. The chart below shows the amount of insulin in a person's bloodstream after a certain amount of time,  $t$ .

$t$ (minutes)	3	15	24	45
Units of Insulin	8.6	4.9	3.1	1.0

Ⓐ Create a best fit exponential function to answer the questions. *Exp. Reg.*

- ① • To the nearest tenth, how many units of insulin are in the person's bloodstream at  $t = 0$ ?
- ② • To the nearest percent, what is the absolute value of the percent change per minute of insulin?

Ⓐ  $y = 10.357(.9498)^x$

①  $10.357 \rightarrow y = 10.357(.9498)^0 \Rightarrow 10.357(1) = \underline{10.357}$

5. For the following problem, round each answer to the nearest hundredth.

- ① • Write the equation of the power function that passes through the points (1, 6) and (3, 14). *Power Reg*
- ② • Based on the above function, what is the value of  $x$  when  $y = 8$ ?

①  $y = 6(x)^{.77}$

②  $8 = 6(x)^{.77}$

$\frac{8}{6} = x^{.77}$

$\sqrt[.77]{\frac{8}{6}} = x$

$1.45 = x$

Stat, Edit,  
 4, L2  
 (x) (y)  
 Stat, Calc,  
 POWREG