

Show all of your work in a neat, organized manner. Round all decimals to the nearest hundredths place.

Be sure to respond to the prompts written in italics.

1.) Acceptance at Michigan State University was 40,571 students in 2010 and 41,289 students in 2014.

a) Assuming the acceptance growth is linear, find a linear model ($f(x) = mx + b$) that gives shows the acceptance, in terms of the year x , where $x = 0$ corresponds to 2010. **3 points**

b) What is the slope of your model? *Explain its meaning in the context of this problem.*

4 points

c) Use your model to predict the enrollments in 2018 and 2020.

2 points

2. The number of factory workers F (in thousands) in the US from 2002 to 2012 can be approximated by the model, $F(t) = 0.004t^4 + 0.46t^2 + 431.6$, $2 \leq t \leq 12$ where t represents the year, with $t = 2$ corresponding to 2002.

Find the average rate of change of the model from 2002 to 2012. Then, *interpret your results in the context of the problem.*

4 points

3. A salesman is paid \$12.00 per hour for regular time and time-and-a-half for overtime. The weekly wage function is given by

$$W(h) = \begin{cases} 12h, & 0 < h \leq 40 \\ 18(h - 40) + 480, & h > 40 \end{cases} \quad \text{where } h \text{ is the number of hours worked in a week.}$$

a) Evaluate $W(30)$, $W(40)$, $W(45)$, and $W(50)$ **4 points**

b) *What do these numbers represent?* **2 points**

4. The number of bacteria in a refrigerated food, N , is given by the model: $N(T) = 10T^2 - 20T + 600$, $1 \leq T \leq 20$ where T is the temperature of the food in degrees Celsius. When the food is removed from refrigeration, the temperature of the food is given by the model: $T(t) = 3t + 2$, $0 \leq t \leq 6$, where t is the time in hours.

a) Find the composition $N(T(t))$. Then, *interpret its meaning in context.* **4 points**

b) Find the time when the bacterial count reaches 1500. Then, *interpret your results in the context of the problem.* **4 points**

BONUS: During a 9hour snowstorm, it snows at a rate of 1 inch per hour for the first 2 hours, at a rate of 2 inches per hour for the next 6 hours, and at a rate of 0.5 inch per hour for the final hour. On looseleaf, write a piece-wise defined function that models this information. *To get credit, you must explain how you got the items that makeup the piece-wise function. You can exemplify it's use to help explain.* **2 bonus pts**