**Module 2 Assessment**

**Application/Free Response**

1. Rhonda is considering two options to repave her driveway. The first option is asphalt, which costs $2,200.00 to install, but requires her to apply sealant every year at the rate of $115.00 per treatment. The other option is concrete, which costs $3550.00 and requires no annual maintenance.
2. Is either or both of these relationships linear? Why?
3. How much will an asphalt driveway cost Rhonda after 3 years? After 7 years?
4. When will the asphalt driveway have cost Linda $3,350.00?

d. If the concrete has a life of 12 years, which choice would cost Rhonda the least amount over the years? Why?

1. The table below represents the percentage of 12th grade students graduating within four years entering a local high school for the listed years:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | 1992 | 1996 | 1998 | 2000 | 2001 | 2002 | 2005 | 2008 | 2012 |
| **%** | 67 | 71 | 73 | 78 | ? | 80 | 86 | 87 | ? |

1. Use the linear regression tools of your graphing calculator to determine the equation for the best fit linear function approximating this data.
2. Use your regression equation to predict the percentage of students graduating within 4 years in 2001 and 2012.
3. Is it reasonable to assume that this relationship will have a linear relationship indefinitely into the future? Why?

3. The Commonwealth of Virginia classifies speed-related automobile accidents on public roads in three categories: fatal crash; injury crash; and property damage crash. Below is a table of speed-related crashes for the years 2001 – 2008:



**(Source of Data: Virginia Department of Motor Vehicles –**

[**http://www.dmv.state.va.us/webdoc/safety/crash\_data/speed/pdf/crash\_type.pdf**](http://www.dmv.state.va.us/webdoc/safety/crash_data/speed/pdf/crash_type.pdf)**)**

* 1. Create a scatterplot of the Fatal Crash data (NOTE: for purposes of this problem, set the year 2001 as year 0 and each succeeding year as the number of years AFTER 2001). Describe the correlation of this data.
  2. Select two of the Fatal Crash data points which best approximate the trend of that data from 2001-2008. Find the slope of the line through those two points. Using the slope and one of the points, determine the equation of the line passing through those points (F(t) = mt + b, when t equals the number of years after 2001, and F equals the number of fatal crashes).
  3. For the Injury Crash data and the Property Damage Crash data, use a graphing calculator to determine the equation of a best fit linear function. Let your independent variable be “t”, for the years after 2001. The two functions, then, are I(t) for injury crashes and P(t) for property damage crashes.
  4. Assuming continuing linear relationships, use your equations (F(t), I(t), and P(t)) to predict the number of each type of speed-related crash in Virginia for the years 2010, 2015, and 2020.
  5. Reflect on your predictions: Are they reasonable? Why or why not? What factors will impact the future number of such crashes other than speed?