**Show all work**

1. Determine the exact value for each of the following limits:
   1. 
   2. 
2. Determine derivatives (with respect to *x*) for the following:
   1. 
   2. 
   3. 
   4. Determine for 
   5. Determine the partial derivative with respect to *x*  for 
3. Integrate the following:
   1. 
   2. 
   3. 
4. For the function :
   1. Determine the average rate of change from to 
   2. Determine the instantaneous rate of change at .
5. Determine the equation of the tangent line at  for  .
6. For , use calculus to determine the location of:
   1. Any maximum or minimum points (tell which are max and which are min)
   2. Any inflection points
7. A store owner currently sells an item for $50 and can sell 100 items per week on average. However, market research says that for each $3 decrease in price, the owner will be able to sell 25 more items per week. What price should the owner set so that the weekly maximum revenue is realized?
8. Let  be a function which describes the relationship between the interest rate *r* for a bank account, and the amount *A* in the account after 2 years.
   1. Explain the meaning of the equation  as it applies to the description above.
   2. Explain the meaning of the equation  as it applies to the description above.
9. Under certain conditions, the number of cancer cells  at time *t* increases at a rate of . Suppose that at 5 days, the number of cells is growing at a rate of 150 cells per day. Determine a number of cells after 12 days if there were 100 cells initially.
10. The wind chill is given by , where *T* is the temperature in Fahrenheit and *w* is the wind speed in miles per hour.
    1. Calculate  and explain it’s meaning in the context of this problem.
    2. Calculate and explain it’s meaning in the context of this problem.
11. Determine the location of any maxima, minima, or saddle points for  (tell what each one is)

12. Determine the area enclosed by the curves  and 