***Math* 2414- *Calculus* II *Homework Sec* 2. Name:**

Evaluate the integrals

|  |  |  |
| --- | --- | --- |
|  |  |  |

|  |  |  |
| --- | --- | --- |
|  |  |  |

1. The region *R* is bounded by the curve  and the  on the interval . Find the volume of the solid that is generated when *R* is revolved in the following ways

|  |  |
| --- | --- |
| 1. About the 2. About the | 1. About the line 2. About the line |

1. Let , where *a* is a real number.
2. Evaluate  and show that its value is independent of *a*.

(***Hint***: split the integral into two integrals over  and ; then use a change of variables to convert the second integral into an integral over .)

1. Let *f* be any positive continuous function on 

Evaluate 

(***Hint***: Use the identity )

1. Let *R* be the region bounded by , the , and the line , where .
2. Find the volume  of the solid generated when *R* is revolved about the  (as a function of *a*).
3. Find the volume  of the solid generated when *R* is revolved about the  (as a function of *a*)./
4. Graph  and . For what values of  is ?
5. Let *R* be the region bounded by the graph of  and the , for . Let  and  be the volumes of the solids generated when *R* is revolved about the and the , respectively, if they exist.
6. For what values of *p* (if any) is ?
7. Repeat part (*a*) on the interval .
8. Let  be the region bounded by the graph of  and the  on the interval  where  and . Let be the region bounded by the graph of  and the  on the interval . Let  and  be the volumes of the solids generated when  and  are revolved about the . Find and graph the relationship between *a* and *b* for which .

Solve the initial value problems

|  |  |
| --- | --- |
|  |  |

1. The consumption of a substrate in a reaction involving an enzyme is often modeled using Michaelis-Menton Kinetics, which involves the initial value problem , , where  is the amount of substrate present at time , and *Q* and *K* are positive constants. Solve the initial value problem with , , and . Notice that the solution can be expressed explicitly only with *t* as a function of *s*. Describe how *s* behaves as .
2. An investment account, which earns interest and has regular deposits, can be modeled by the initial value problem  for , with . The constant *a* reflects the monthly interest rate, *m* is the rate of monthly deposits, and is the initial balance in the account. Solve the initial value problem with , , and . After how many months does the account have a balance of $7,500?