Teaching Assitant

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Office hours:

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TBD

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Warm Up

Together in groups, discuss plain language definitions for the following terms:

- Function
- Limit
- Continuity
- Vector
- Derivative
- Integral
- Level set

Problem 1

Problem 9.1.14

Find the equation of each of the following geometric objects.

a. The plane parallel to the xy-plane that passes through the point $(-4, 5, -12)$.

b. The plane parallel to the yz-plane that passes through the point $(7, -2, -3)$.

c. The sphere centered at the point $(2, 1, 3)$ and has the point $(-1, 9, -1)$ on its surface.

d. The sphere whose diameter has endpoints $(-3, 1, -5)$ and $(7, 9, -1)$.

Problem 2

9.1.16

... if we borrow \$18,000 to buy a car, the monthly payment M that we need to make to pay off the loan is given by the formula

$$M(r,t) = \frac{1500r}{1 - \frac{1}{(1+\frac{r}{12})^{12t}}}.$$

a. Find the monthly payments on this loan if the interest rate is 6% and the duration of the loan is 5 years.

b. Create a table of values that illustrates the trace of M with r fixed at 5%. Use yearly values of t from 2 to 6. Round payments to the nearest penny. Explain in detail in words what this trace tells us about M.

c. Create a table of values that illustrates the trace of M with t fixed at 3 years. Use rates from 3% to 11% in increments of 2%. Round payments to the nearest penny. Explain in detail what this trace tells us about M.

d. Consider the combinations of interest rates and durations of loans that result in a monthly payment of \$200. Solve the equation $M(r,t) = 200$ for t to write the duration of the loan in terms of the interest rate. Graph this level curve and explain as best you can the relationship between t and r.

Vector Spaces

A vector space V over a field F is a non empty-set V equiped with the binary operations of vector addition and scalar multiplication such that for u, v, w vectors and a, b scalars we have

- Associativity of addition: $u + (v + w) = (u + v) + w$.
- Commutativity of addition: $u + v = v + u$.
- Additive identity: $v + 0 = v$ for every v.
- Addititive inverses: $v + (-v) = 0$ for every v.
- Compatability of multiplication: $a(bv) = (ab)v$.
- Multiplicative identity: $1v = v$.
- Distribution over vector addition: $a(u + v) = au + av$.
- Distibution over field addition: $(a + b)v = av + bv$.

Problems 3, 4 and 5

9.2.1

For each of the following, perform the indicated computation

(a) $(10\vec{i}+7\vec{j}-5\vec{k})-(-6\vec{i}+4\vec{j}+7\vec{k})$.

(b) $(10\vec{i}+6\vec{j}-3\vec{k})-2(-3\vec{i}+10\vec{j}+8\vec{k})$.

9.2.2

Find a vector a that has the same direction as $(-6,7,6)$ but has length 5.

9.2.3

Let $a=\langle -3,-4,-4\rangle$ and $b=\langle 2,2,4\rangle$. Show that there are scalars s and t so that $sa+tb=\langle 20,24,32\rangle$.

Attendance