Problem Set 6 (Total Points: 127), Due July 25th

Review Question

Problem (1)**.** (25 points) I'm currently looking for an apartment. This problem takes the perspective of an apartment manager. Suppose you manage an apartment complex with 20 units. If you set the rent at \$900/month all the apartment are rented. As you increase the rent fewer apartments are rented. Specifically if you set the rent to \$$p$/month you rent out $20-(p-900)/50$ apartments. Find the rent that maximizes your profit.

Algebra Questions

Find all values of x which solve the following equations. (4 points each).

(2) $\dfrac{x+1}{2}+\dfrac{2x-1}{3}=2$

(3) $x^4-x^2=0$

(4) $\dfrac{x/4}{2}=\dfrac{4}{x/2}$

(5) (Bonus) $\sqrt[4]{x}=\dfrac{12}{7-\sqrt[4]{x}}$

Simplify and expand the follow expressions (4 points each).

(6) $(2-x)^2$

(7) $(x^2-3\tan(x)-1)(4-\sin(x))$

(8) $\ln(e^{2x}\cdot e^{3\cos(x)})$

(9) $\dfrac{\sin(x)+(x+1)^2}{\sin(x)+(x+2)^2-4x-4}$

(10) (Bonus) $\dfrac{\sin(x)/\cos(x)}{\tan(x)/(\sin(x)+1)}$

Sigma Notation

Problem (11)**.** (5 points) Find $\sum_{k=1}^{3} 1+k^2$

Problem (12)**.** (5 points) Find $\sum_{j=3}^{7} jx$. (Your answer will have an x in it).

Problem (13)**.** (10 points) Which of the following expanded sums corresponds to

$$\sum_{k=0}^{\infty} \frac{(-1)^k}{(2k)!} x^{2k}$$

(a) $1 + \frac{x^2}{2} + \frac{x^4}{24} + \frac{x^6}{720} + \cdots$

(b) $1 - \frac{x^2}{2} + \frac{x^4}{24} - \frac{x^6}{720} + \cdots$

(c) $1 + \frac{x}{2} + \frac{x^2}{24} + \frac{x^3}{720} + \cdots$

(d) $1 - \frac{x}{2} + \frac{x^2}{24} - \frac{x^3}{720} + \cdots$

Taylor Series

All of these problems require work to receive full credit.

Problem (14)**.** (15 points) Find the first 3 terms of the Maclaurin Series for e^{2x}.

Problem (15)**.** (25 points) Find the Maclaurin Series for $cos(x)$. Express your answer with sigma notation.

Problem (16)**.** (15 points) Find the first 3 terms of the Taylor series for x^3 centered at $x = 1$.

Problem (17)**.** (Bonus, 25 points) Find the Taylor series for $\ln(x^2)$ centered at $x = 1$.