Math 135 Name ___________________________

Sample Questions Chapters 11 and 3

Chamberlin

1. Give the fifth term of the sequence with the explicit formula $a_n = \dfrac{n+5}{n^2}$

2. Determine the second, third and fourth terms of the sequence given by the following recursive formula.

   $x_1 = 5$; $x_n = 2x_{n-1} + 1$

3. Write out the following series as a sum (don't actually compute the sum): $\sum_{k=1}^{4} \dfrac{(-1)^k}{3k}$

4. Consider the arithmetic sequence 6, 10, 14, 18, . . . .

   a) Find the twenty-fourth term of sequence using the nth term formula for an arithmetic sequence.

   b) Find the sum of the first 24 terms of the sequence by using the summation formula for an arithmetic sequence.

5. Find the sum of the geometric series $\sum_{i=1}^{25} 2(1.02)^{i-1}$ using the formula for the sum of a finite geometric sequence. Round your answer to the nearest hundredth.

6. Find the sum of the infinite geometric sequence $8, 2, \dfrac{1}{2}, \dfrac{1}{8}, \dfrac{1}{32}, \ldots$ . Write your answer as an improper fraction.

7. Write as a fraction in simplest terms: $0.0\overline{65}$.

8. Find the number of people it took to create you going back 25 generations.

9. Expand $(2x^2 + y^3)^5$ using the Binomial Theorem.

10. Determine the domain of the following function: $f(x) = \dfrac{1}{x^2 + 7x + 12}$.

11. Find the equation of the line that passes through $(-5, 2)$ and is parallel to the line given by the equation $y = -\dfrac{1}{4}x - \dfrac{2}{3}$. **Leave your answer in slope-intercept form** (in other words, solve your final answer for y).

12. Consider the polynomial function $P(x) = 3x^5 - 6x^4 - 3x^3 + 24x^2 - 30x + 12$

a) List all possible rational zeros of P($x$).
b) Find all the real and/or complex zeros of P($x$) by using synthetic division to find three of the real zeros, and then use methods of your choice to find the remaining zeros. State the **multiplicity** of each zero.

13. Use the **leading term test** to discuss the behavior of the graph of $P(x) = 6x^3 - 18x + 12$ as $x \to \infty$ **and** as $x \to -\infty$ (In other words, what does $P(x)$ do as $x$ goes to the right or left?).

14. Suppose you are told that a polynomial function with real coefficients has degree 3 and at least one complex zero. How many real zeros will the function have? Explain your reasoning.

15. Find the equation of the slant asymptote of the graph of $f(x) = \dfrac{x^2 + 2x - 1}{x - 5}$.

16. Consider the rational function $f(x) = \dfrac{2x^2 - 2}{x^2 - 9}$.

a) Find the $y$-intercept.
b) Find the $x$-intercept
c) Find the vertical asymptote(s).
d) Find the horizontal asymptote.
e) What type of symmetry does the graph of the function have? Justify your answer.
f) Sketch the graph. Include any asymptotes as dotted lines. **Use your calculator to plot at least four points in addition to the intercept(s).**

17. Find the zeros (or roots) of the given equation (see "Sample Question Answers").