BC Calculus
Review for Test # 7 (115)

105. A) Find the generator of the sequence whose first several terms are

$$-\frac{2}{1}, \frac{5}{3}, -\frac{10}{7}, \frac{17}{15}, -\frac{26}{31}, \frac{37}{63} \ldots .$$

Determine whether the sequences in Parts B, C, D and E converge or diverge. If the sequence conveges, tell what it converges to.

B) $a_n = \dfrac{n^2}{4+3n-2n^2}$ C) $a_n = \dfrac{2^n}{n^2}$ D) $a_n = \dfrac{2^n}{3^n}$ E) $a_n = \left(1+\dfrac{1}{n}\right)^n$

106. Given the parametric equations $x = 2t+1$, and $y = t^2 + 4t$:
A) graph the parametric equations—without using a graphing calculator.
B) find $\dfrac{dy}{dx}$.
C) eliminate the parameter and express y in terms of x.

107. A) Convert $y = x + 1$ to polar form.
B) Convert $r = 2\csc\theta$ to rectangular form.

108. Given the two points $P_1 = (2, -1)$ and $P_2 = (-4, 3)$ find:
A) the vector from P_1 to P_2.
B) a vector normal to the vector found in part (A).
C) Find the unit vector tangent to $y = 3x^2 - 4x + 1$ at the point where $x = 3$.

109. A) Find the length of $y = x^{3/2}$ on the interval [0, 8].
B) Estimate the length of $y = x^2$ on the interval [0, 4] by using the trapezoidal rule with $n = 6$.

110. Graph each of the following polar equations (do not use a graphing calculator).
A) $r = 2$ B) $r = 2\sin\theta$ C) $r = 2\cos\theta$
D) $r = 2\sin(2\theta)$ E) $r = 2\cos(2\theta)$ F) $r = 2\sin(3\theta)$

111. Evaluate each of the following limits—without using a graphing calculator.
A) $\lim\limits_{x\to\pi^-} (\sin x)^{\tan x}$ B) $\lim\limits_{x\to\frac{\pi}{2}} (\sin x)^{\tan x}$ C) $\lim\limits_{x\to\frac{\pi}{2}^-} (\tan x)^{\cos x}$

112. A) Develop the trig subs that would be made in an integral containing $\sqrt{x^2-16}$.
B) Develop the trig subs that would be made in an integral containing $\sqrt{x^2+16}$.
C) Develop the trig subs that would be made in an integral containing $\sqrt{16-x^2}$.

113. Integrate each of the following.

A) $\int \frac{x}{x^2+9}\,dx$ B) $\int \frac{x}{\sqrt{x^2+9}}\,dx$ C) $\int \frac{1}{x^2+9}\,dx$

D) $\int \frac{1}{\sqrt{x^2+9}}\,dx$ E) $\int \frac{1}{\sqrt{9-x^2}}\,dx$ F) $\int \frac{1}{\sqrt{x^2-9}}\,dx$

114. Find the length of the graph of the parametric curve defined by $y = 3\cos\theta$ and $x = 3\sin\theta$ on the interval $[0, 2\pi]$.

115. Integrate each of the following.

A) $\int \frac{1}{x^2-1}\,dx$ B) $\int \frac{2x^2+6x-2}{x^3-x^2-2x}\,dx$

C)

	Word description	Differential equation	Growth equation
Exponential growth:			
Logistic growth:			

D) Explain the significance of the number C in the logistic growth equation.

E) Suppose 12 black-footed ferrets are placed in a new environment. After 5 years the black-footed ferret population had increased to 28. It is estimated that the carrying capacity of this environment is 200 black-footed ferrets.

a) Assume the black-footed ferret population is governed by logistic growth. Find a formula for P(t), the number of black-footed ferrets in this environment t years after the initial placement.

b) Use the formula for P(t) to estimate the number of black-footed ferrets in the environment after 20 years.