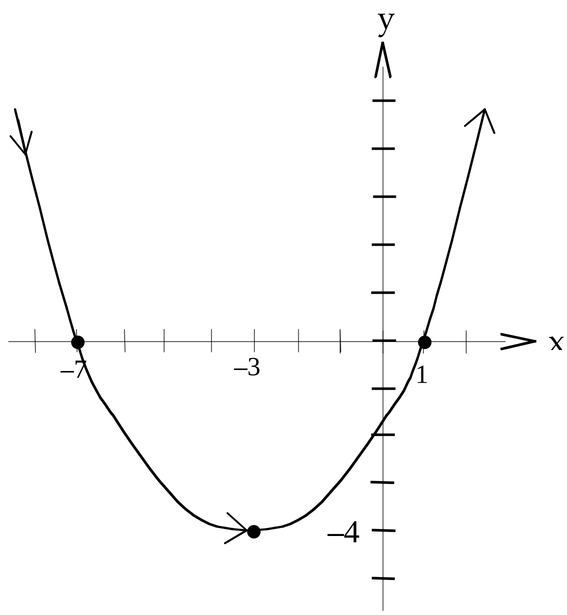
BC Calculus
Test # 7 (1–115) Review Answers

105A. $a_n = (-1)^n \dfrac{n^2+1}{2^n-1}$, $n = 1, 2, 3, \ldots$

B. converges to $-\dfrac{1}{2}$ | C. diverges

D. converges to 0 | E. converges to e

106A.



B. $\dfrac{dy}{dx} = t + 2 = \dfrac{1}{2}x + \dfrac{3}{2}$

C. $y = \dfrac{1}{4}x^2 + \dfrac{3}{2}x - \dfrac{7}{4}$

107A. $r = \dfrac{1}{\sin\theta - \cos\theta}$

B. y = 2

108A. (–6, 4)

B. (4, 6)

C. $\left(\dfrac{1}{\sqrt{197}}, \dfrac{14}{\sqrt{197}}\right)$

109A. $\dfrac{8}{27}\left(19\sqrt{19} - 1\right) \approx 24.243$

B. 16.891

110A. a circle centered at the pole with a radius of 2

B. a circle, centered along the positive y axis, tangent to the pole, with a diameter of 2

C. a circle, centered along the positive x axis, tangent to the pole, with a diameter of 2

D. a rose curve with 4 petals, each being 2 units long, centered along π/4, 3π/4, 5π/4, and 7π/4

E. a rose curve with 4 petals, each being 2 units long, centered along each axis

F. a rose curve with 3 petals, each being 2 units long, centered along π/6, 5π/6, and 3π/2

111A. 1 B. 1 C. 1

112A. $\sec\theta = \frac{x}{4}$, $x = 4\sec\theta$, $dx = 4\sec\theta\tan\theta\, d\theta$, $\sqrt{x^2 - 16} = 4\tan\theta$

B. $\tan\theta = \frac{x}{4}$, $x = 4\tan\theta$, $dx = 4\sec^2\theta\, d\theta$, $\sqrt{x^2 + 16} = 4\sec\theta$

C. $\sin\theta = \frac{x}{4}$, $x = 4\sin\theta$, $dx = 4\cos\theta\, d\theta$, $\sqrt{16 - x^2} = 4\cos\theta$

113A. $\ln\sqrt{x^2 + 9} + C$

B. $\left(x^2 + 9\right)^{\frac{1}{2}} + C$

C. $\frac{1}{3}\arctan\frac{x}{3} + C$

D. $\ln\left|\sqrt{x^2 + 9} + x\right| + C$

E. $\arcsin\frac{x}{3} + C$

F. $\ln\left|x + \sqrt{x^2 - 9}\right| + C$

114. 6π

115A. $\ln\sqrt{\frac{x-1}{x+1}} + C$

B. $\ln|x| + 3\ln|x-2| - 2\ln|x+1| + C$

C.

	Word description	Differential equation	Growth equation
Exponential growth	The rate of growth is proportional to the number present.	$\frac{dP}{dt} = kP$	$P(t) = P_0 e^{kt}$
Logistic growth	The rate of growth is proportional to the number present, and a constant (the carrying capacity) minus the number present.	$\frac{dP}{dt} = kP(C - P)$	$P(t) = \frac{C}{1 + ke^{-Cat}}$

D. C represents the carrying capacity of the environment.

Ea. $P(t) = \dfrac{200}{1 + \frac{47}{3}\left(\frac{129}{329}\right)^{\frac{t}{5}}}$

b. P(20) = 145.954