Name Solutions

AP Calculus BC Ch4 Part I 11/25/08

SHOW ALL OF YOUR WORK. Indicate clearly the methods that you use because you will be graded on the correctness of your methods as well as the accuracy of your final answers.

1\. Find the sum: $\sum_{i=2}^{20}(i-1)^2 =$ $= \sum_{1}^{19} i^2 = \frac{19(20)(39)}{6}$

2) Find the approximate area under the curve of $f(x)=\sqrt{x+1}$ on (0,1) using :

T(4) =

$$\Delta x = \frac{b-a}{n} = \frac{1-0}{4} = \frac{1}{4}$$

$$T(4) = \frac{1}{2}\left(\frac{1}{4}\right)\left[f(0)+2f\left(\tfrac{1}{4}\right)+2f\left(\tfrac{1}{2}\right)+2f\left(\tfrac{3}{4}\right)+f(1)\right]$$

$$= \frac{1}{8}\left[1+2\left(\sqrt{\tfrac{5}{4}}\right)+2\sqrt{\tfrac{3}{2}}+2\sqrt{\tfrac{7}{4}}+\sqrt{2}\right]$$

3) The rate of growth of a particular population is given by:

$$\frac{dP}{dt} = 40t^3 - 70t^{4/3}$$

Where P is the population size and t is the time in years. The initial population is 16,000.

Determine the population function *P(t).*

$$16000 + \int_0^x 40t^3 - 70t^{4/3}\, dt$$

5) Use total u-substitution to evaluate: $\int_0^{\frac{\pi}{2}} \sin(\frac{\theta}{2})\cos(\frac{\theta}{2})d\theta$

$u = \sin(\frac{\theta}{2})$

$du = \cos(\frac{\theta}{2}) \cdot \frac{1}{2}$

$u(\frac{\pi}{2}) = \frac{\sqrt{2}}{2}, u(0) = 0$

$$\int_0^{\frac{\pi}{2}} \sin(\tfrac{\theta}{2})\cos(\tfrac{\theta}{2})d\theta = 2\int_0^{\frac{\sqrt{2}}{2}} udu$$

$$= 2\left[\frac{u^2}{2}\right]_0^{\frac{\sqrt{2}}{2}} = \frac{1}{2}$$

Name Solutions AP Calculus BC Ch4 Part I 11/25/08

SHOW ALL OF YOUR WORK. Indicate clearly the methods that you use because you will be graded on the correctness of your methods as well as the accuracy of your final answers.

1. Find the sum: $\sum_{i=2}^{20}(i-1)^2 = \; = \sum_{1}^{19} i^2 = \dfrac{19(20)(39)}{6}$

2) Find the approximate area under the curve of $f(x)=\sqrt{x+1}$ on (0,1) using :

T(4) =

$$\Delta x = \frac{b-a}{n} = \frac{1-0}{4} = \frac{1}{4}$$

$$T(4) = \frac{1}{2}\left(\frac{1}{4}\right)\left[f(0)+2f\left(\tfrac{1}{4}\right)+2f\left(\tfrac{1}{2}\right)+2f\left(\tfrac{3}{4}\right)+f(1)\right]$$

$$= \frac{1}{8}\left[1+2\left(\sqrt{\tfrac{5}{4}}\right)+2\sqrt{\tfrac{3}{2}}+2\sqrt{\tfrac{7}{4}}+\sqrt{2}\right]$$

3) The rate of growth of a particular population is given by:

$$\frac{dP}{dt} = 40t^3 - 70t^{4/3}$$

Where P is the population size and t is the time in years. The initial population is 16,000.

Determine the population function *P(t)*.

$$16000 + \int_0^x 40t^3 - 70t^{4/3}\,dt$$