Answers

May 13, 2006

1. $y = x + 1$

2. $M = T = S = \pi/2$

3. (a) $\frac{1}{5}x\sin(5x+1) + \frac{1}{25}\cos(5x+1) + C$ (b) 3/20

4.

$$y = \frac{-1}{t - \frac{1}{3}e^{3t} - \frac{2}{3}}$$

5. (a) $y(0) = 0:$ $y = 16 - 16e^{-\frac{1}{4}t}$, $y(0) = 16:$ $y = 16$ (constant solution)
(b) $y' = 4 - .25y$, (c) 16

6. (a) 16, (b) (i) $4 + 4(\frac{3}{4}) + 4(\frac{3}{4})^2$, (ii) 16

7. (a) $(x-1) - \frac{1}{2}(x-1)^2 + \frac{1}{3}(x-1)^3$
(b) $-\frac{1}{100}$

8. (a) $k = 1$, $C = -1$, (b) 7/3

9. $.5 - .4332 = .0668$

10. We are given that $p_0 = 0.5$. Since $p_0 = e^{-\lambda}$, this says that $0.5 = e^{-\lambda}$. Take logs to get $\lambda = -\ln(0.5)$.
(a) $Pr(X > 1) = 1 - p_0 - p_1 = 1 - e^{-\lambda} - \frac{\lambda}{1}e^{-\lambda}$. Since we already know that $e^{-\lambda} = 0.5$, this equals $1 - 0.5 - (-\ln(0.5)) * 0.5$.
(b) $E(X) = \lambda = -\ln(0.5)$

December 15, 2005

1. (a) $\frac{1}{2}\sin(x^2+1) + C$, (b) $\frac{2}{3}x^{2/3}\ln(x) - \frac{4}{9}x^{3/2} + C$, (c) 1/2

2. (a) $f(x) \geq 0$, $\int_A^B f(x)\,dx = 1$, (b) $E(X) = 3/5$, $Var(X) = 1/25$

3. (a) e^{-2}, (b) $\frac{71}{3}e^{-4}$, (c) $[f(3.1) + f(3.3) + f(3.5) + f(3.7) + f(3.9)](.2)$, where $f(x) = x/(x+1)$.

4. (a) $e^x = 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \cdots$, (i) $1 + x^2 + \frac{1}{2}x^4$, (ii) $2x + 2x^3 + x^5$
(b) $a = 25/3, r = -5/9$. Since $|r| < 1$, the series is convergent. The sum is 75/14.

5. (a) $2 + 8(x-4) + \frac{3}{16}(x-4)^2 - \frac{1}{128}(x-4)^3$
(b) $y = \frac{1}{2} + e^{-t} + Ce^{-t}$. When $y(0) = 4$, $y = \frac{1}{2} + e^{-t} + \frac{5}{2}e^{-t}$.

6. (a) 19/8, (b) $y' = .04y - 20000, y(0) = 500000$.
(c) $y(0) = 6$: the graph goes up towards ∞
$y(0) = 0$ and $y(0) = 4$: the graphs go downward and are asymptotic to $y = -1$