WebAssign
4.9 Antiderivadas (Homework)

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Diferencial, section B, Spring 2019
Instructor: Christiaan Ketelaar

Current Score : 1 / 15.5 **Due :** Monday, May 13, 2019 11:59 PM CST**Last Saved : n/a Saving... ()**

The due date for this assignment is past. Your work can be viewed below, but no changes can be made.

Important! Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may *not* grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

Request Extension

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1. 1/1 points | Previous AnswersSCalcET8 4.9.002.

Find the most general antiderivative of the function. (Check your answer by differentiation. Use C for the constant of the antiderivative.)

$f(x) = x^2 - 5x + 7$

$F(x) =$
$$13x3−52x2+7x+C

$\boxed{C + \frac{x^3}{3} - \frac{5x^2}{2} + 7x}$

Solution or Explanation

$f(x) = x^2 - 5x + 7 \quad \Rightarrow \quad F(x) = \frac{x^3}{3} - 5\frac{x^2}{2} + 7x + C = \frac{1}{3}x^3 - \frac{5}{2}x^2 + 7x + C$

Check: $F'(x)\ \frac{1}{3}(3x^2) - \frac{5}{2}(2x) + 7 + 0 = x^2 - 5x + 7 = f(x)$

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2. –/1 pointsSCalcET8 4.9.005.

Find the most general antiderivative of the function. (Check your answer by differentiation. Use C for the constant of the antiderivative.)

$f(x) = x(18x + 6)$

$F(x) =$ (No Response) $\boxed{C + 6x^3 + 3x^2}$

Solution or Explanation

$f(x) = x(18x + 6) = 18x^2 + 6x \quad \Rightarrow \quad F(x) = 18\frac{x^3}{3} + 6\frac{x^2}{2} + C = 6x^3 + 3x^2 + C$

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3. –/1 pointsSCalcET8 4.9.007.

Find the most general antiderivative of the function. (Check your answer by differentiation. Use C for the constant of the antiderivative.)

$f(x) = 7x^{2/5} + 2x^{-4/5}$

$F(x) =$ (No Response) $\boxed{C + 5x^{7/5} + 10\sqrt[5]{x}}$

Solution or Explanation

$f(x) = 7x^{2/5} + 2x^{-4/5} \quad \Rightarrow \quad F(x) = 7\left(\frac{5}{7}x^{7/5}\right) + 2(5x^{1/5}) + C = 5x^{7/5} + 10x^{1/5} + C$

4. –/1 pointsSCalcET8 4.9.013.

Find the most general antiderivative of the function. (Check your answer by differentiation. Use C for the constant of the antiderivative. Remember to use absolute values where appropriate.)

$f(x) = \frac{1}{5} - \frac{8}{x}, \quad x > 0$

$F(x) =$ (No Response) $\boxed{\frac{1}{5}x - 8\ln(|x|) + C}$

Solution or Explanation

$$f(x) = \frac{1}{5} - \frac{8}{x} = \frac{1}{5} - 8\left(\frac{1}{x}\right) \text{ has domain } (-\infty, 0) \cup (0, \infty), \text{ so } F(x) = \begin{cases} \frac{1}{5}x - 8\ln(|x|) + C_1 & \text{if } x < 0 \\ \frac{1}{5}x - 8\ln(|x|) + C_2 & \text{if } x > 0 \end{cases}$$

Since $f(x)$ is restricted to $x > 0$, $F(x) = \frac{1}{5}x - 8\ln(|x|) + C$.

See the example (b) for a similar problem.

5. –/1 pointsSCalcET8 4.9.016.

Find the most general antiderivative of the function. (Check your answer by differentiation. Use C for the constant of the antiderivative.)

$r(\theta) = \sec(\theta)\tan(\theta) - 9e^{\theta}$

$R(\theta) =$ (No Response) $\boxed{C - 9e^{\theta} + \sec(\theta)}$

Solution or Explanation

$r(\theta) = \sec(\theta)\tan(\theta) - 9e^{\theta} \Rightarrow R(\theta) = \sec(\theta) - 9e^{\theta} + C_n$ on the interval $\left(n\pi - \frac{\pi}{2}, n\pi + \frac{\pi}{2}\right)$.

6. –/1 pointsSCalcET8 4.9.018.

Find the most general antiderivative of the function. (Check your answer by differentiation. Use C for the constant of the antiderivative.)

$g(v) = 5\cos(v) - \frac{3}{\sqrt{1 - v^2}}$

$G(v) =$ (No Response) $\boxed{C - 3\sin^{-1}(v) + 5\sin(v)}$

Solution or Explanation

$g(v) = 5\cos(v) - \frac{3}{\sqrt{1 - v^2}} \Rightarrow G(v) = 5\sin(v) - 3\sin^{-1}(v) + C$

7. –/1 pointsSCalcET8 4.9.019.

Find the most general antiderivative of the function. (Check your answer by differentiation. Use C for the constant of the antiderivative.)

$f(x) = 3^x + 6\sinh(x)$

$F(x) =$ (No Response) $\boxed{C + \frac{3^x}{\ln(3)} + 6\cosh(x)}$

Solution or Explanation

$f(x) = 3^x + 6\sinh(x) \Rightarrow F(x) = \frac{3^x}{\ln(3)} + 6\cosh(x) + C$

8. –/1 pointsSCalcET8 4.9.023.

Find the antiderivative F of f that satisfies the given condition. Check your answer by comparing the graphs of f and F.

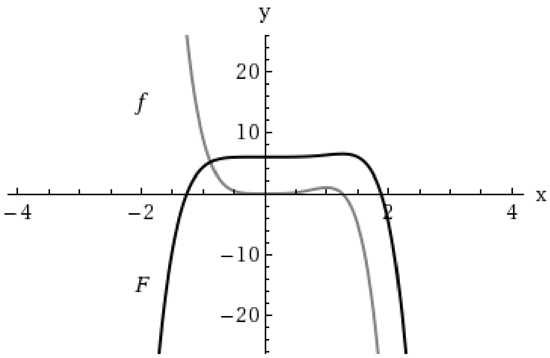
$f(x) = 5x^4 - 4x^5, \quad F(0) = 6$

$F(x) =$ (No Response) $\boxed{x^5 - \frac{2}{3}x^6 + 6}$

Solution or Explanation

$f(x) = 5x^4 - 4x^5 \Rightarrow F(x) = 5 \cdot \frac{x^5}{5} - 4 \cdot \frac{x^6}{6} + C = x^5 - \frac{2}{3}x^6 + C.$ $F(0) = 6 \Rightarrow 0^5 - \frac{2}{3} \cdot 0^6 + C = 6 \Rightarrow C = 6$, so $F(x) = x^5 - \frac{2}{3}x^6 + 6$.

The graph confirms our answer since $f(x) = 0$ when F has a local maximum, f is positive when F is increasing, and f is negative when F is decreasing.



9. –/1 pointsSCalcET8 4.9.025.

Find f. (Use C for the constant of the first antiderivative and D for the constant of the second antiderivative.)

$f''(x) = 28x^3 - 15x^2 + 8x$

$f(x) =$ (No Response) $\boxed{Cx + D + \frac{7x^5}{5} - \frac{5x^4}{4} + \frac{4x^3}{3}}$

Solution or Explanation

$f''(x) = 28x^3 - 15x^2 + 8x \Rightarrow f'(x) = 28\left(\frac{x^4}{4}\right) - 15\left(\frac{x^3}{3}\right) + 8\left(\frac{x^2}{2}\right) + C = 7x^4 - 5x^3 + 4x^2 + C \Rightarrow$

$f(x) = 7\left(\frac{x^5}{5}\right) - 5\left(\frac{x^4}{4}\right) + 4\left(\frac{x^3}{3}\right) + Cx + D = \frac{7}{5}x^5 - \frac{5}{4}x^4 + \frac{4}{3}x^3 + Cx + D$

10. –/2.5 pointsSCalcET8 4.9.041.

Find f.

$f''(\theta) = \sin(\theta) + \cos(\theta), \quad f(0) = 2, \quad f'(0) = 1$

$f(\theta) =$ (No Response) $\boxed{-\sin(\theta) - \cos(\theta) + 2\theta + 3}$

Solution or Explanation

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11. –/1 pointsSCalcET8 4.9.061.

A particle is moving with the given data. Find the position of the particle.

$a(t) = 2t + 5, \quad s(0) = 8, \quad v(0) = -9$

$s(t) =$ (No Response) $\boxed{\frac{1}{3}t^3 + \frac{5}{2}t^2 - 9t + 8}$

Solution or Explanation

$a(t) = v'(t) = 2t + 5 \Rightarrow v(t) = t^2 + 5t + C$. $v(0) = C$ and $v(0) = -9 \Rightarrow C = -9$, so $v(t) = t^2 + 5t - 9$ and $s(t) = \frac{1}{3}t^3 + \frac{5}{2}t^2 - 9t + D$.

$s(0) = D$ and $s(0) = 8 \Rightarrow D = 8$, so $s(t) = \frac{1}{3}t^3 + \frac{5}{2}t^2 - 9t + 8$.

12.–/1 pointsSCalcET8 4.9.063.

A particle is moving with the given data. Find the position of the particle.

$a(t) = 13 \sin(t) + 7 \cos(t), \quad s(0) = 0, \quad s(2\pi) = 12$

$s(t) =$ (No Response) $\frac{6t}{\pi} - 13\sin(t) - 7\cos(t) + 7$

Solution or Explanation

$a(t) = v'(t) = 13 \sin(t) + 7 \cos(t) \Rightarrow v(t) = -13 \cos(t) + 7 \sin(t) + C \Rightarrow s(t) = -13 \sin(t) - 7 \cos(t) + Ct + D$. $s(0) = -7 + D = 0$ and $s(2\pi) = -7 + 2\pi C + D = 12 \Rightarrow D = 7$ and $C = \frac{6}{\pi}$. Thus, $s(t) = -13 \sin(t) - 7 \cos(t) + \frac{6}{\pi}t + 7$.

13.–/1 pointsSCalcET8 4.9.072.

The linear density of a rod of length 4 m is given by $\rho(x) = 7/\sqrt{x}$, in grams per centimeter, where x is measured in centimeters from one end of the rod. Find the mass of the rod.

(No Response) 280 g

Solution or Explanation

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14.–/1 pointsSCalcET8 4.9.517.XP.

A particle is moving with the given data. Find the position of the particle.

$v(t) = 1.5\sqrt{t}, \quad s(25) = 131$

$s(t) =$ (No Response) $t^{\frac{3}{2}} + 6$

Solution or Explanation

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15.–/0 pointsSCalcET8 4.9.015.

Find the most general antiderivative of the function. (Check your answer by differentiation. Use C for the constant of the antiderivative.)

$$g(t) = \frac{4 + t + t^2}{\sqrt{t}}$$

$G(t) =$ (No Response) $C + \frac{2t^{5/2}}{5} + \frac{2t^{3/2}}{3} + 8\sqrt{t}$

Solution or Explanation

$$g(t) = \frac{4 + t + t^2}{\sqrt{t}} = 4t^{-1/2} + t^{1/2} + t^{3/2} \Rightarrow G(t) = 8t^{1/2} + \frac{2}{3}t^{3/2} + \frac{2}{5}t^{5/2} + C$$

16.–/0 pointsSCalcET8 4.9.030.

Find f. (Use C for the constant of the first antiderivative, D for the constant of the second antiderivative and E for the constant of the third antiderivative.)

$f'''(t) = \sqrt{t} - 7 \cos(t)$

$f(t) =$ (No Response) $\frac{8}{105}t^{7/2} + 7\sin(t) + Ct^2 + Dt + E$

Solution or Explanation

$f'''(t) = \sqrt{t} - 7 \cos(t) = t^{1/2} - 7 \cos(t) \Rightarrow f''(t) = \frac{2}{3}t^{3/2} - 7 \sin(t) + C_1 \Rightarrow f'(t) = \frac{4}{15}t^{5/2} + 7 \cos(t) + C_1 t + D \Rightarrow f(t) = \frac{8}{105}t^{7/2} + 7 \sin(t) + Ct^2 + Dt + E$,

where $C = \frac{1}{2}C_1$.

17.–/0 pointsSCalcET8 4.9.065.

A stone is dropped from the upper observation deck of a tower, 750 m above the ground. (Assume g = 9.8 m/s^2.)

(a) Find the distance (in meters) of the stone above ground level at time t.

$h(t)$ = (No Response) $750 - 4.9t^2$

(b) How long does it take the stone to reach the ground? (Round your answer to two decimal places.)

(No Response) 12.37 s

(c) With what velocity does it strike the ground? (Round your answer to one decimal place.)

(No Response) -121.2 m/s

(d) If the stone is thrown downward with a speed of 2 m/s, how long does it take to reach the ground? (Round your answer to two decimal places.)

(No Response) 12.17 s

Solution or Explanation

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18.–/0 pointsSCalcET8 4.9.078.

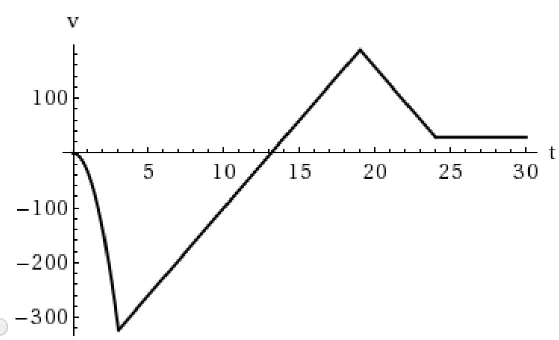
A model rocket is fired vertically upward from rest. Its acceleration for the first three seconds is $a(t) = 72t$, at which time the fuel is exhausted and it becomes a freely "falling" body. Sixteen seconds later, the rocket's parachute opens, and the (downward) velocity slows linearly to -28 ft/s in 5 seconds. The rocket then "floats" to the ground at that rate.

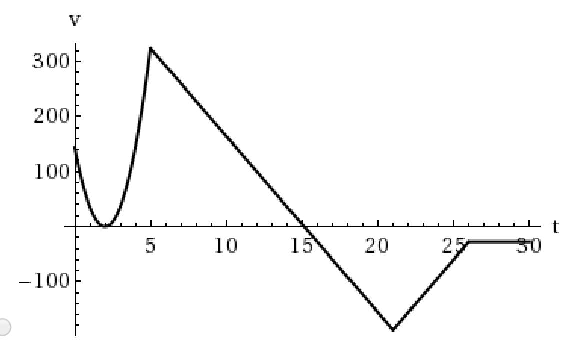
(a) Determine the position function s and the velocity function v (for all times t).

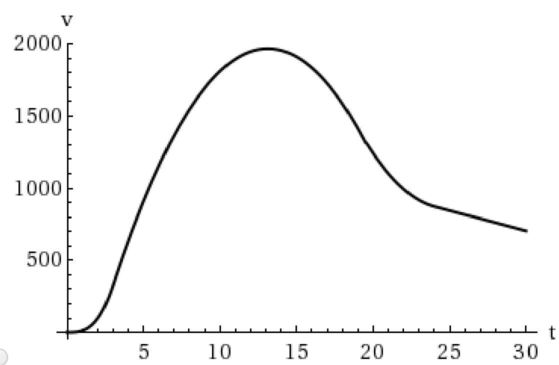
$$v(t) = \begin{cases} \boxed{\text{(No Response)}}\ \boxed{36t^2} & \text{if } 0 \le t \le 3 \\ \boxed{\text{(No Response)}}\ \boxed{-32(t-3)+324} & \text{if } 3 < t \le 19 \\ \boxed{\text{(No Response)}}\ \boxed{32(t-19)-188} & \text{if } 19 < t \le 24 \\ \boxed{\text{(No Response)}}\ \boxed{-28} & \text{if } t > 24 \end{cases}$$

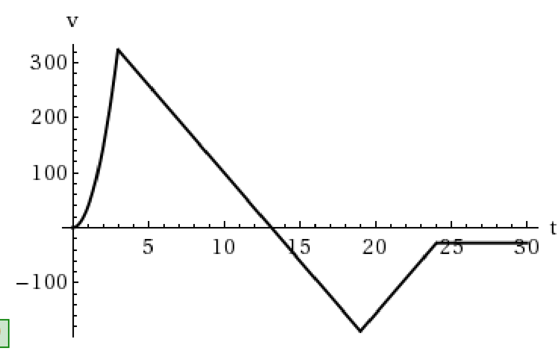
$$s(t) = \begin{cases} \boxed{\text{(No Response)}}\ \boxed{12t^3} & \text{if } 0 \le t \le 3 \\ \boxed{\text{(No Response)}}\ \boxed{-16(t-3)^2+324(t-3)+324} & \text{if } 3 < t \le 19 \\ \boxed{\text{(No Response)}}\ \boxed{16(t-19)^2-188(t-19)+1412} & \text{if } 19 < t \le 24 \\ \boxed{\text{(No Response)}}\ \boxed{-28(t-24)+872} & \text{if } t > 24 \end{cases}$$

Sketch the graph of v.

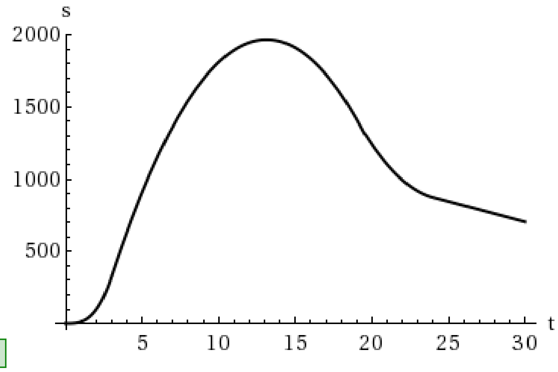


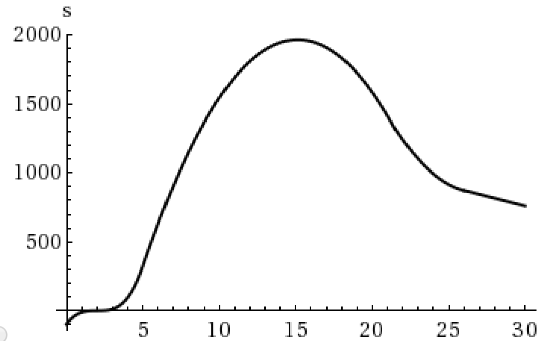


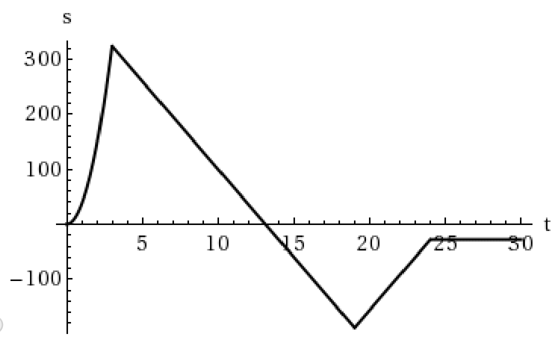


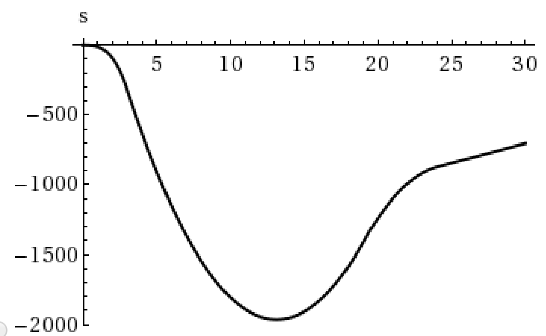


Sketch the graph of s.









(b) At what time does the rocket reach its maximum height?

(No Response) 13.125 s

What is that height? (Round your answer to the nearest integer.)

(No Response) 1964.25 ft

(c) At what time does the rocket land? (Round your answer to one decimal place.)

(No Response) 55.1 s

Solution or Explanation

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