

1. $v(t) = 2t - 2, a(t) = 2$

2. $v(3) = 8\pi, a(3) = -\frac{20\pi^2}{9}$

3. $y = 4x - \pi + 2$

4. There are none.

5. $x = 2$ and $x = -2$

6. 5

7. $\frac{1}{3}$

8. 1

9. $\frac{-2xy+2y+y^2-15x^2}{x^2+2x+2xy}$

10. $y - 1 = \frac{4}{3}(x - 1)$

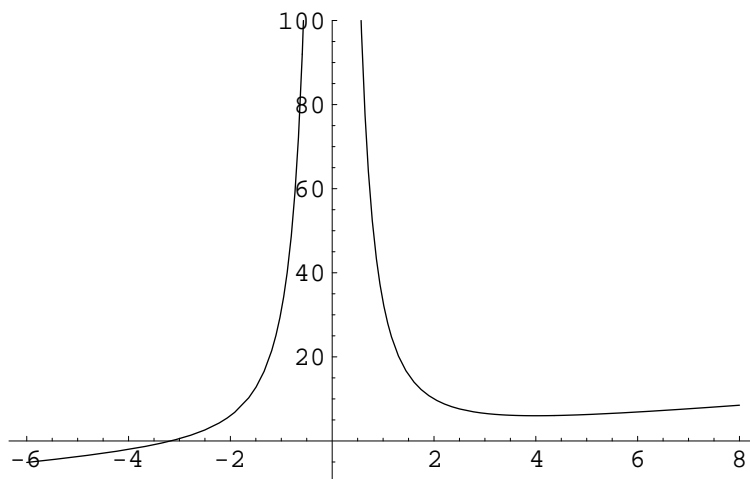
11. $1/3$

12. $v(t) = 3t^2 - 6t + 1, a(t) = 6t - 6, 3 - \sqrt{6} < t < 3 + \sqrt{6}$

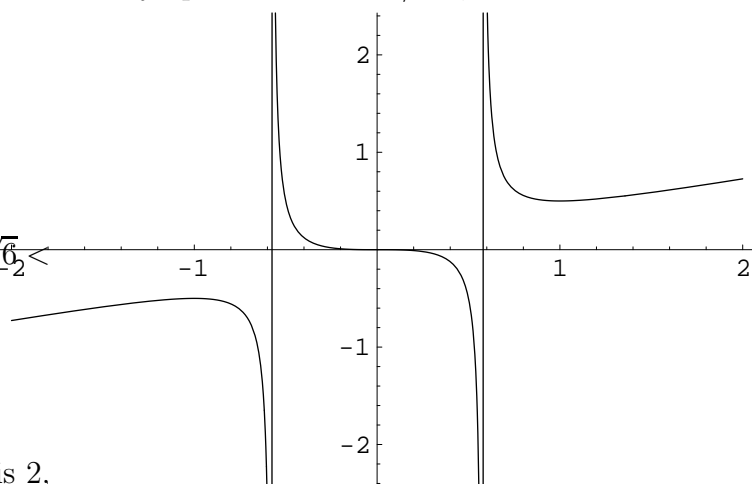
13. $36/5.7$ sec

14. No. The limit at zero from the left is 2, while the limit from the right is 5. 0 is not a removable discontinuity.

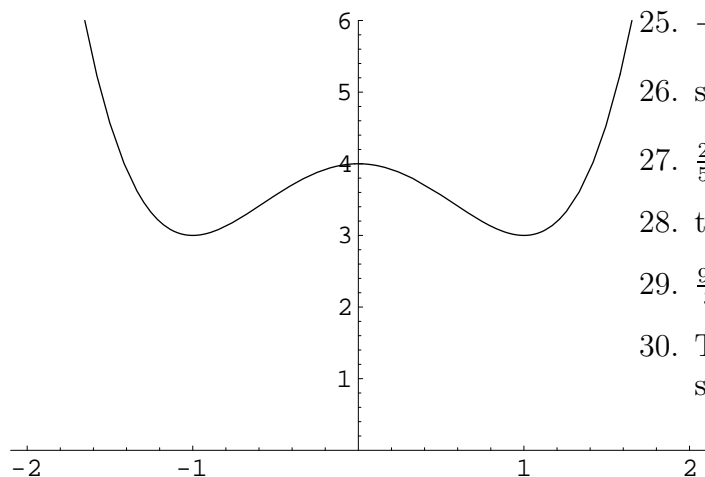
15. Local minimum at $x = 4$, concave up at every x , vertical asymptote at $x = 0$,



16. Local minimum at $x = -1$, local maximum at $x = 1$, concave up on $(-1/\sqrt{3}, 0)$ and $(1/\sqrt{3}, \infty)$, concave down on $(-\infty, -1/\sqrt{3})$ and $(0, 1/\sqrt{3})$, point of inflection at $(0, 0)$, vertical asymptote at $x = \pm 1/\sqrt{3}$,



17. Local minima at $x = -1$ and $x = 1$, local maximum at $x = 0$, concave up on $(-\infty, -1/\sqrt{3})$ and $(1/\sqrt{3}, \infty)$, concave down on $(-1/\sqrt{3}, 1/\sqrt{3})$,



25. $-\frac{1}{2} \cos(2x) + C$

26. $\sin\left(\frac{x-1}{x}\right) + C$

27. $\frac{2}{5}\sqrt{x}(2x^2 + 5x - 5) + C$

28. $\tan(x) - x + C$

29. $\frac{98}{3}$

30. This problem was stated incorrectly. It should have been

$$\int \frac{1}{\sqrt{x}(\sqrt{x} + 1)^2} dx.$$

The answer is then $-\frac{2}{\sqrt{x+1}} + C$

18. Let $s(t)$ be the position function. If the average velocity is 70 mph over the time interval $[a, b]$, then

$$\frac{s(b) - s(a)}{b - a} = 70.$$

The mean value theorem says there is a number c in the interval (a, b) with

$$s'(c) = \frac{s(b) - s(a)}{b - a} = 70.$$

This says the velocity at time c is 70 mph.

19. $\frac{51}{67} \approx 0.7612$

20. 0.871

21. 2513.27 m/sec, 3554.31 m/sec

22. 2 ft/sec

23. $r = \sqrt[4]{225,000/\pi^2}$, $h = 300/\sqrt{225,000}$

24. She should row to a point $100/\sqrt{3}$ meters down shore and walk the rest of the way.

31. $-\frac{1}{3} \cot^3(x) + C$

32. 24

33. $\frac{85}{4}$

34. $\frac{2}{\pi}$

35. Look in book or notes

36. Look in book or notes.

37. Look in book or notes.

38. $2 + \frac{\pi^3}{6}$

39. $\frac{9}{2}$

40. 12π

41. $n = 394$, using $M = 6$. If you use a better approximation for M , you may be able to reduce n slightly.

$$\int_0^\pi \sin^3 x dx \approx$$

1.33333

42. $n = 32$ using $M = 60$. If you use a better approximation for M , you may be able to reduce n slightly.

$$\int_0^\pi \sin^3 x \, dx \approx$$

1.33333

43. Done in class. Just rotate the region under the graph of $y = \frac{r}{h} x$ between $x = 0$ and $x = h$ about the x -axis.

44. 2π

45. $\frac{\pi}{64}$

46. $\frac{32a^3\pi}{105}$

47. 2.0261

48. $(\frac{4}{3}, \frac{38}{27})$

49. $(0, -\frac{1}{2})$

50. For $y = x^n$ and $y = x^{n+1}$, center of mass is

$$\left(\frac{n+1}{n+3}, \frac{(n+1)(n+2)}{(2n+1)(2n+3)} \right)$$

For $n = 3$, the center of mass is outside the region.