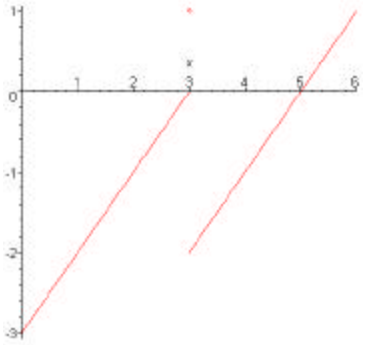
Answers for Math 100 Final Exam Review Questions

1. a) ¼ b) - 1/9 c) ½ d) $+\infty$

2.



3. a) $\lim_{\Delta x \to 0} \dfrac{\sqrt{x+\Delta x-3}-\sqrt{x-3}}{\Delta x} = \dfrac{1}{2\sqrt{x-3}}$

b) $\lim_{\Delta x \to 0} \dfrac{\dfrac{x+\Delta x}{x+\Delta x-1}-\dfrac{x}{x-1}}{\Delta x} = \dfrac{-1}{(x-1)^2}$

4. a) $\dfrac{x^2}{(3-x^3)^{4/3}}$ b) $\dfrac{x^2(7x+6)}{2\sqrt{x+1}}$

c) $\dfrac{\cos 2q}{\sqrt{\sin 2q}}$ d) $24x\tan^2(4x^2)\sec^2(4x^2)$

e) $\sin 2x + \cos 2x$ f) $\dfrac{6x^2+2}{(1-3x^2)^2}$

5. $\dfrac{10}{(x-3)^3}$ 6. $4x-2y=p-2$

7. a) $-\dfrac{4x+y}{x+6y}$ b) $\dfrac{2\sqrt{y}-2y}{4y\sqrt{y}+x}$

8. ½ 9. $x+2y=3$

10. 0.1136 rad/sec 11. 0.3 m/sec

12. $-\dfrac{1}{3}, -\dfrac{1}{2}$

13. Max $\left(\dfrac{p}{4}, \sqrt{2}\right)$ Min $\left(\dfrac{5p}{4}, -\sqrt{2}\right)$

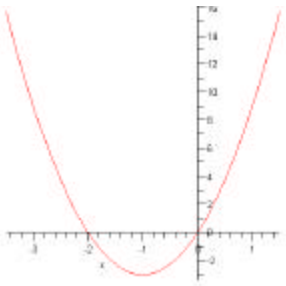
14. $c = -\sqrt{\dfrac{3}{2}}$ 15. Discontinuous at x = -1

16. Increasing on (2, 4)
Decreasing on $(-\infty, 2)$, $(4, \infty)$

17. Relative max (1, 2)
Relative mins (0, 1) and (2, 1)

18. (4, 0) , (2, -32)

19.



20. a) $y = 0$ b) $y = \frac{5}{2}$, $y = -\frac{5}{2}$

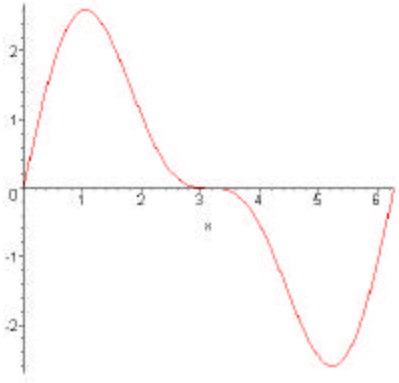
21. -1

22. a) critical points (-1, 4) (1, 0)
inflection point (0, 2)

22. b) Critical points

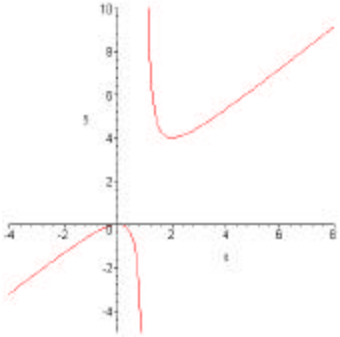
$(\frac{p}{3}, 2.6), (0, p), (\frac{5p}{3}, -2.6)$

Inflection points: $(p, 0)$, (1.82, 1.45), (4.46, -1.45)



c) Critical points (0, 0) , (2, 4)

No inflection points



23. 50 m by 75 m , 300 m of fencing

24. 0.65 ft by 0.65 ft , volume = 6.3 cu. ft.

25. $\left(\frac{5}{2}, \sqrt{\frac{7}{2}}\right)$ 26. x = 1.7693

27. 0.27 cu. cm.

28. a) 1.975 b) 4.00417

29. a) $\frac{x^3}{3} - \frac{x^2}{2} + C$ b) $-\cos q + C$

c) $-\frac{2}{3}\cot 3x + C$ d) $\frac{1}{3}\sec 3x + C$

30. a) $\frac{16}{3}$ b) $\frac{4}{3}$ 31. a) -4 b) $\sqrt{3} - 1$

32. $\frac{2\sqrt{2}}{p}$ 33. $\frac{2}{\sqrt{3}}$

34. a) $-\frac{1}{27}(4 - 9x^2)^{\frac{3}{2}} + C$ b) $\frac{2^{\frac{3}{2}} - 1}{3}$

c) $\frac{1}{12}\sin^4 3x + C$ d) $\sqrt{\tan 2x} + C$

35. a) 0.509 b) 1.896

36. a) $\frac{x}{x^2 + 4}$ b) $3x^2 \ln(2x + 1) + \frac{2x^3}{2x + 1}$

c) $\frac{xy - y}{x - xy}$ d) $\frac{x^3\sqrt{2x+3}}{(x-2)^2}\left(\frac{3}{x} + \frac{1}{2x+3} - \frac{2}{x-2}\right)$

37. a) $2x - \ln|x + 1| + C$ b) $\frac{1}{4}(\ln x)^2 + C$

c) $\frac{1}{4}\ln|\sec 4x + \tan 4x| + C$ d) $-\frac{1}{2}\ln|\csc(x^2)| + C$

38. $f^{-1}(x) = \sqrt[3]{\frac{x+1}{3}}$ 39. $\frac{1}{8}$

40. a) $\frac{3}{x^2}e^{-\frac{3}{x}}$ b) $e^{\sin\sqrt{x}}\frac{\cos\sqrt{x}}{2\sqrt{x}}$

c) $\frac{1}{e^x + 1}$ d) $\frac{-4(1 + e^{2x})}{(2x + e^{2x})^2}$

41. a) $\frac{1}{2}e^{-\frac{2}{x}} + C$ b) $2\sqrt{e^x + 1} + C$

c) $\frac{1}{2}(e^8 - e^2)$ d) $\frac{7}{\ln 4}$

42. a) $x^{1-x}\left(\frac{1-x}{x} - \ln x\right)$ b) $x^{e^x}\left(\frac{e^x}{x} + (\ln x)e^x\right)$

c) $x^2 3^x (3 + x\ln 3)$

43. a) $\frac{3}{2}(x^2 - \ln(1 + x^2)) + C$ b) $y = C(4 - x)^2$

c) $\sin y + \cos x = C$ d) $y = 500 - 493e^{-x}$

44. 4.64 hours