Fall 2005 Math 151
Exam 3 Review Exercises - Solutions

Review Exercises: Sections 4.4 - 6.3

1. $f'(x) = \dfrac{4x}{2x^2 - 8}$

2. $y' = (\cos x)^{\tan x}\left(\sec^2 x \ln(\cos x) - \dfrac{\tan x \sin x}{\cos x}\right)$

3. $\dfrac{-2}{e^2}$

4. a) $\dfrac{4 \ln 2}{\ln 5} \approx 1.722$ years

   b) 36.57 grams

5. $t = \dfrac{12 \ln 2}{\ln(1.5)}$ hours.

6. $t \approx 8.15$ minutes.

7. $100e^{-.7}$ kg of salt.

8. $\dfrac{2}{\sqrt{21}}$

9. $y' = 2x \cos^{-1}(e^{3x}) - x^2 \dfrac{3e^{3x}}{\sqrt{1 - e^{6x}}}$

10. $y - \dfrac{\pi}{4} = x - 1$

11. $\dfrac{2\pi}{3}$

12. $\sqrt{6}$

13. $-\dfrac{\pi}{3}$

14. $\dfrac{\sqrt{1 - x^2}}{x}$

15. $0 \le x \le \sqrt[3]{\dfrac{1}{4}}$

16. a) $\dfrac{3}{2}$

    b) 2

    c) e^8

    d) 1

    e) 0

17. $c = \sqrt{10}$

18. a) Absolute maximum of 3 at $x = 0$; Absolute minimum of -15 at $x = 3$

    b) Absolute maximum of 0 at $x = 1$; Absolute minimum of $-e^{-1}$ at e^{-1}

19. a) Inc $(-\infty, \frac{1}{3}) \cup (1, \infty)$; Dec $(\frac{1}{3}, 1)$; local max $(\dfrac{1}{3}, \dfrac{4}{27})$; local min $(1, 0)$

    b.) Inc $(-\infty, -1)$ and $(0, \infty)$ Dec $(-1, 0)$ local max $(-1, e^{-2})$, local min $(0, 0)$

    c.) Always increasing; no local extrema.

    d.) Inc: $(-1, 1)$, Dec: $(-\infty, -1)$ and $(1, \infty)$, local max: None, local min: $(-1, -\dfrac{1}{4})$

20. Concave up: $(-\infty, -4)$ and $(0, \infty)$; concave down $(-4, 0)$: Inflection points: $(0, 13)$ and $(-4, -243)$

21. a.) critical values: $x = -1$, $x = 1$, $x = 3$;

    f increasing: $(-1, 1)$, $(3, \infty)$; f decreasing: $(-\infty, -1)$, $(1, 3)$; f local min: $x = -1$,$x = 3$; f local max: $x = 1$; f concave up: $(-\infty, 0)$ and $(2, \infty)$; f concave down: $(0, 2)$; f inflection points: $x = 0$, $x = 2$

22. 4x4x2; Area = 48 sq inches

23. $\sqrt{5}$

24. base of triangle is $2\sqrt{3}$ and the height is 3.

25. $f(x) = 2e^x + 4 \sin x - 4x - 1$

26. $s(t) = .01t^4 + 2t^2 + 10t$

27. a.) $s(t) = -4.9t^2 + 450$

    b.) The stone hits the ground with a speed of $\approx$ 93.91 meters per second

28. The car travels a total distance of ≈ 67.2 feet.

29. The pie reaches a height of $\dfrac{881}{64}$ feet.

30. $\mathbf{v}(t) = \langle 1, 2t - 1 \rangle$, $\mathbf{r}(t) = \langle t, t^2 - t \rangle$