

Answer key for 1500 Midterm Exam, October 28, 2005

1. (a) $\frac{1}{6}$
(b) -1
(c) $\frac{1}{2}$
2. $a = -1$ and $b = 1$
3. (a) $f'(x) = \frac{4}{3}x^{-\frac{2}{3}} + \sec x \tan x - \frac{2}{x^3}$
(b) $f'(x) = \frac{(x^2 + \cos x) - x(2x - \sin x)}{(x^2 + \cos x)^2}$
(c) $f'(x) = e^{x \tan x} (\tan x + x \sec^2 x)$
4. $f'(x) = -\frac{1}{(x+3)^2}$
5. $y = \frac{5}{4}x$
6. See the text book page 177.
7. $\frac{dh}{dt} = -\frac{1}{2\pi} \text{ cm/min}$, and so the water level is dropping at a rate of $\frac{1}{2\pi} \text{ cm/min}$.

Answer key for 1500 Midterm Exam, February 23, 2007

1. (a) -1
(b) 0
(c) $\frac{2}{3}$
(d) $\frac{1}{4}$
2. $k = -1$
3. (a) $y' = \cos(\cos x)(-\sin x)$
(b) $y' = \frac{9}{4}x^{\frac{5}{4}} - e^{x^2}(2x)$
(c) $y' = \frac{(-\sin x)(1 + \sqrt{x}), -(\cos x)(\frac{1}{2\sqrt{x}})}{(1 + \sqrt{x})^2}$
(d) $y' = (\cos x)\sqrt{\pi - x} + (\sin x)(\frac{-1}{2\sqrt{\pi - x}})$
4. (a) See the text book page 146.
(b) $f'(a) = 2a - 2$
5. See the text book page 177.
6. (a) $y' = \frac{1}{3}$.
(b) $y - 1 = \frac{1}{3}(x - 1)$
7. $\frac{dy}{dt} = -\frac{3}{2} m/sec$, and so B approaches 0 at a rate of $\frac{3}{2} m/sec$.

Answer key for 1500 Midterm Exam, October 29, 2009

1. (a) $b = 1$
(b) No values of b
2. (a) $\frac{1}{2}$
(b) $b = -\frac{1}{4}$
(c) $+\infty$
(d) $\frac{1}{2}$
3. (a) $v = x^3$
(b) $\frac{dx}{dt} = 2 \text{ cm/s}$
(c) $s = 6x^2$
(d) $\frac{ds}{dt} = 1200 \text{ cm}^2/\text{s}$
4. $y = -2x$
5. (a) $y' = 3x^2 - x^{-\frac{4}{3}} + e^x - e x^{e-1}$
(b) $y' = \sec^2(\sin(1 + x^2)) \cos(1 + x^2) (2x)$
(c) $y' = (2x - e^x)(\cot x - \frac{1}{x^2}) + (x^2 - e^x)(-\csc^2 x + \frac{2}{x^3})$
(d) $y' = \frac{\frac{1}{4} x^{-\frac{3}{4}} (5x + 1) - 5 \sqrt[4]{x}}{(5x + 1)^2}$
6. See the text book page 190.

Answer key for 1500 Midterm Exam, February 25, 2010

PART A: Multiple Choice Questions

Question	1	2	3	4	5	6	7
Answer	C	C	B	C	A	E	A

Part B : Long Answer Questions

8.

- (a) 3
- (b) 1
- (C) -3

9.

$$c = 1$$

10.

$$y'(0,1) = 2$$

11.

(a) $y' = 2x + e^5 - \frac{1}{x^2}$

(b) $y' = -2e^{-2x} + \sqrt{x+2} + \frac{x+1}{2\sqrt{x+2}}$

(c) $y' = \frac{(-5 \sin x)(2\sqrt{x}) - \frac{1}{\sqrt{x}}(5 \cos x + 1)}{4x}$

(d) $y' = \frac{4}{3} (\sqrt{x} x^\pi + \cos(2 \sin x))^{1/3} \left[\frac{1}{2\sqrt{x}} x^\pi + \sqrt{x} (\pi x^{\pi-1}) - \sin(2 \sin x) (2 \cos x) \right]$

12.

$$f'(x) = \frac{-3}{(2+x)^2}$$

13.

$\frac{dy}{dt} = \frac{-10}{\sqrt{41}} m/s$, so the distance between the man and his dog is decreasing at the rate of $\frac{10}{\sqrt{41}} m/s$.