Math 1041 **Answer Key to Test 2 Review** **Fall 2016**

Section 3.5

12. $y' = \dfrac{-y\sin(xy)}{x\sin(xy) + \cos y}$

Section 3.6

48. $y' = (\sin x)^{\ln x}\left(\ln x\,\cot x + \dfrac{\ln(\sin x)}{x}\right)$

Section 3.7

4. **(a)** $v(t) = te^{-t}(-t+2)$ **(b)** $v(1) = \frac{1}{e}$ ft/s **(c)** at $t = 0\,\text{s}$ or $t = 2\,\text{s}$ **(d)** $0 < t < 2$

(e) total distance is $8e^{-2} - 36e^{-6}$ ft **(g)** $a(t) = e^{-t}(t^2 - 4t + 2)$, $a(1) = -\frac{1}{e}$ ft/s^2

(i) at $t = 1$, v is positive, but a is negative, therefore, the particle is slowing down

Section 3.9

4. $\frac{dA}{dt} = 140$ cm^2/s **8c.** $\frac{dA}{dt} = \frac{1}{2}\left(\frac{da}{dt}\,b\sin\theta + a\,\frac{db}{dt}\sin\theta + ab\cos\theta\,\frac{d\theta}{dt}\right) = \frac{21}{8}\sqrt{3} + 0.3$ cm^2/min

12. $\frac{dx}{dt} = -\frac{x}{y}\frac{dy}{dt}$; at $(4,2)$, $\frac{dx}{dt} = 6$ cm/s, i.e., the x-coordinate is increasing at a rate of 6 cm/s

Section 3.10

24. $L(x) = \frac{1}{4} - \frac{1}{16}(x-4) \implies \frac{1}{4.002} \approx L(4.002) = \frac{1}{4} - \frac{1}{16}(-0.002) = \frac{1999}{8000} = 0.249875$

Chapter 3 Review. Exercises

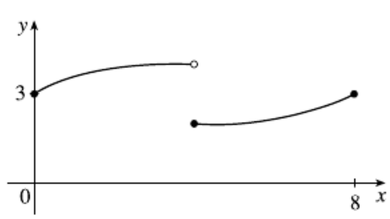
14. $y' = \tan x$ **72.** $f'(x) = 2x\,g'(x^2)$ **74.** $f'(x) = g'(g(x))\,g'(x)$ **80.** $h'(x) = \dfrac{f'(x)g(x) - f(x)g'(x)}{2\,[g(x)]^{3/2}\sqrt{f(x)}}$

Section 4.1

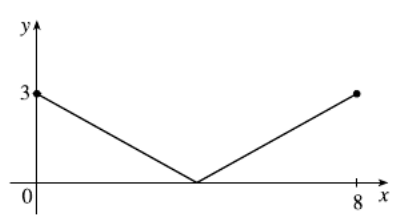
42. $\frac{2}{3}\sqrt{2}$ and $-\frac{2}{3}\sqrt{2}$ **56.** Absolute maximum: $f\left(\frac{1}{\sqrt{3}}\right) = \boldsymbol{\frac{3^{3/4}}{4}}$. Absolute minimum: $f(0) = \mathbf{0}$

Section 4.2

2. Possible graphs

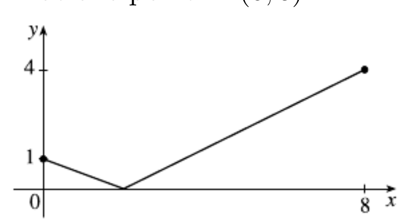


Not continuous



Not differentiable

4. A function must be not differentiable at least at one point in $(0, 8)$



6. $f'(c) = 0 \Rightarrow c = -\frac{2}{3}$ or $c = 2$, but 2 is not in the interval $(-2, 2)$, so only $c = -\frac{2}{3}$ satisfies the conclusion of the Mean Value Theorem.

12. $c = \frac{2}{\sqrt{3}}$ and $c = -\frac{2}{\sqrt{3}}$

Section 4.3

22a. (a) The critical numbers are $0, 1,$ and $\frac{4}{7}$.

52a. HA: $y = -1$ and $y = 0$, VA: $x = 0$

56a. HA: $y = e^{\pi/2}$ and $y = e^{-\pi/2}$, no VA

Section 4.4

18. 0, **no** L'Hospital's Rule