Math 1041 Answer-Keys to Even Review Problems for Test 2 Spring 2017

Section 3.4

16. $g'(x) = (2x-1)\, e^{x^2-x}$

Section 3.5

12. $y' = -\dfrac{y\,\sin(xy)}{x\,\sin(xy)+\cos y}$ **28.** $y' = \dfrac{x+y}{x+4y}$ and the tangent line is $y = -\dfrac{1}{2}x + 2$

50. $y' = \dfrac{2x}{1+x^4}$ **52.** $g'(x) = -\dfrac{1}{2\sqrt{x}\sqrt{1-x}}$

Section 3.6

18. $y' = \csc x$ **50.** $y' = (\ln x)^{\cos x}\left(\dfrac{\cos x}{x\,\ln x} - \sin x\,\ln(\ln x)\right)$

Chapter 3 Review:

4. $y' = \dfrac{(1+\cos x)\sec^2 x + \tan x\,\sin x}{(1+\cos x)^2}$ **12.** $y' = \dfrac{4\,\arcsin x}{\sqrt{1-4x^2}}$ **14.** $y' = \tan x$

72. $y' = 2x\,g'(x^2)$ **76.** $y' = g'(x)\,e^{g(x)}$ **80.** $y' = \dfrac{g(x)f'(x) - f(x)g'(x)}{2[g(x)]^{3/2}\sqrt{f(x)}}$

Section 4.1

62. Critical numbers are $x = \pm 1$. $f(1) = 1 - \dfrac{\pi}{2}$ is absolute minimum value and $f(4) = 4 - 2\tan^{-1}(4)$ is absolute maximum value.

Section 4.2

8. $f(x) = x + 1/x$, $\left[\frac{1}{2}, 2\right]$. $f'(x) = 1 - 1/x^2 = \dfrac{x^2-1}{x^2}$. f is a rational function that is continuous on its domain, $(-\infty, 0) \cup (0, \infty)$, so it is continuous on $\left[\frac{1}{2}, 2\right]$. f' has the same domain and is differentiable on $\left(\frac{1}{2}, 2\right)$. Also, $f\left(\frac{1}{2}\right) = \frac{5}{2} = f(2)$. $f'(c) = 0 \;\Leftrightarrow\; \dfrac{c^2-1}{c^2} = 0 \;\Leftrightarrow\; c^2 - 1 = 0 \;\Leftrightarrow\; c = \pm 1$. Only 1 is in $\left(\frac{1}{2}, 2\right)$, so 1 satisfies the conclusion of Rolle's Theorem.

Section 4.3:

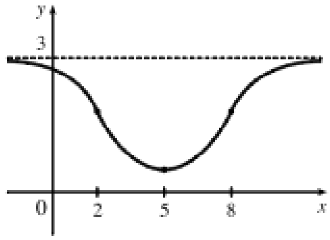
14. (a) f is increasing on $(\dfrac{\pi}{2}, \dfrac{3\pi}{2})$ and f is decreasing on $(0, \dfrac{\pi}{2}) \cup (\dfrac{3\pi}{2}, 2\pi)$.

(b) Local minimum is $f(\dfrac{\pi}{2}) = -2$ and local maximum is $f(\dfrac{3\pi}{2}) = 2$.

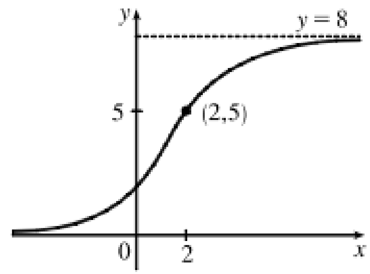
(c) f is concave upward on $(\dfrac{\pi}{6}, \dfrac{5\pi}{6})$ and f is downward on $(0, \dfrac{\pi}{6}) \cup (\dfrac{5\pi}{6}, 2\pi)$. Inflection points are $(\dfrac{\pi}{6}, -\dfrac{1}{4})$ and $(\dfrac{5\pi}{6}, -\dfrac{1}{4})$.

22a. Since $y' = x^3(x-1)^2(7x-4)$ so crotical numbers are $0,\ 1,$ and $\frac{4}{7}$.

29.



31.



34.

(a) $\frac{dy}{dx} > 0$ (f is increasing) and $\frac{d^2y}{dx^2} > 0$ (f is concave upward) at point B.

(b) $\frac{dy}{dx} < 0$ (f is decreasing) and $\frac{d^2y}{dx^2} < 0$ (f is concave downward) at point E.

(c) $\frac{dy}{dx} < 0$ (f is decreasing) and $\frac{d^2y}{dx^2} > 0$ (f is concave upward) at point A.

Note: At C, $\frac{dy}{dx} > 0$ and $\frac{d^2y}{dx^2} < 0$. At D, $\frac{dy}{dx} = 0$ and $\frac{d^2y}{dx^2} \leq 0$.

44. **(a)** G is increasing on $(0, 1)$ and G is decreasing on $(-\infty, 1) \cup (1, \infty)$.

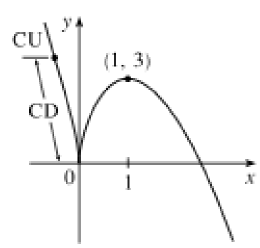
(b) Local minimum is $G(0) = 0$ and local maximum is $G(1) = 3$.

(c) G is concave upward on $(-\infty, -\frac{1}{2})$

and concave downward on $(-\frac{1}{2}, 0) \cup (0, \infty)$.

Inflection point is $(-\frac{1}{2}, \frac{6}{\sqrt[3]{4}})$.

(d)



48. **(a)** S is increasing on $(0, 4\pi)$ and never decrease.

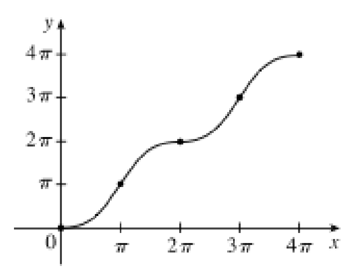
(b) No local minimum or local maximum.

(c) S is concave upward on $(o, \pi) \cup (2\pi, 3\pi)$

and concave downward on $(\pi, 2\pi) \cup (3\pi, 4\pi)$.

Inflection points are (π, π), $(2\pi, 2\pi)$, and $(3\pi, 3\pi)$.

(d)



Section 4.4

14. $\frac{3}{2}$ **40.** 2