

MTH 141 Review Guide Answer Key

- I. 1. a.) -1 b.) -1.5 c.) -2 d.) $-\infty$ e.) ∞
 f.) 2 g.) 1 h.) ∞ j.) d.n.e. k.) d.n.e.
 l.) 0 m.) d.n.e. n.) 1 o.) 0 p.) d.n.e.
 q.) $-\frac{1}{2}$ r.) ∞ s.) 0
2. a.) 5 b.) 2 c.) d.n.e. d.) 4 e.) ∞

- II. 1. a.) -2, -1, 0, 2 b.) $f(0) = -1.5$
2. a.) $(-\infty, \infty)$ b.) $(-\infty, 5) \cup (5, \infty)$ c.) $(-\infty, 5]$ d.) $(-\infty, 5)$
 e.) $(-\infty, -5) \cup (-5, 5) \cup (5, \infty)$ f.) $(-\infty, -5) \cup (-5, \infty)$
 g.) $(-\infty, -5) \cup (-5, 5) \cup (5, \infty)$ h.) $(-\infty, 5) \cup (5, \infty)$

- III. 1.) $y' = 25x^4 + 20x + 3x^{-2}$ 2.) $\frac{dy}{dx} = \frac{y^2 - y}{x - 2xy}$
- 3.) $h'(x) = \frac{3}{2(3x+1)\sqrt{\ln(3x+1)}}$ 4.) $k'(x) = 60x(5x^2 - 3)^5$
- 5.) $g'(x) = 2xe^{x^3} + 3x^4e^{x^3}$
- 6.) $h'(x) = \frac{4}{(2x-3)^2}$
- 7.) $k'(x) = \frac{x}{x^2-1}$

- IV. 1.) a = 1, b = 3, c = 1 2.) a = 2, b = 6
- 3.) (a.)-(iii.) (b.)-(i.)(c.)-(v.) (d.)-(vi.) (e.)-(ii.)
 (f.)-(vii.)
- 4.) (a.)-(v.) (b.)-(iii.) (c.)-(iv.) (d.)-(ii.)
- 5.)
- | | critical points | inflection points |
|------|---------------------------|---|
| (a.) | (1, -5) min | none |
| (b.) | (0, 0) min
(4, 4) max | none |
| (c.) | (0, 0) max
(4, 8) min | none |
| (d.) | (0, 2) max | $(\frac{1}{\sqrt{3}}, \frac{3}{2}), (\frac{-1}{\sqrt{3}}, \frac{3}{2})$ |
| (e.) | (1, 0) max
(3, -4) min | (2, -2) |

- V.
- | | | | |
|-----|----------------------------|-----|---|
| 1.) | $x + c$ | 2.) | $\frac{1}{2}e^{2x} - \ln x + c$ |
| 3.) | $\frac{1}{4}x^4 + x^2 + c$ | 4.) | $x^2 + \frac{5}{2}x - \frac{3}{2x} + c$ |
| 5.) | 18 | 6.) | $f(x) = 6x^{1/3} + 2$ |
- VI.
- | | | |
|-----|----------------------------------|---------------------------|
| 1.) | 5.101 billion people; | .0102 billion people/year |
| 2.) | $e^9 = 8103$ units | |
| 3.) | $C(x) = 300x + 0.01x^2 + 10,000$ | |
| 4.) | \$4200 | |
| 5.) | $t = 6$ cents per dollar | |
| 6.) | 374.88 dollars/week | |
| 7.) | -0.5164 ft/sec | |
| 8.) | (a.) 0.4 million dollars/year | $P'(5) = 0.5 - 0.02(5)$ |
| | (b.) 0.4 million dollars/year | $(P(6)-P(4))/2$ |