Answers to Review Worksheet for Exam 3
MA 15910, Spring 2016

1) $\dfrac{15x-8}{2\sqrt{5x-4}}$ 2) $12(x-1)\left(e^{x^2-2x}\right)$ 3) $xe^{1-x}(2-x)$

4) $\dfrac{dy}{dx}=\dfrac{6x(1-x)}{e^{2x}}$ or $\dfrac{6x-6x^2}{e^{2x}}$ 5) $h'(x)=4(4e^x+x^3)^3(4e^x+3x^2)$

6) $\dfrac{72x}{(4x^2+9)^4}$ 7) $9(2x^5+3)^3(14x^5+1)$

8) $\dfrac{2(2x-3)^3(6x^2+9x+8)}{(3x^2+2)^2}$ 9) $\dfrac{2(4x^2+1)}{x(2x^2+1)}$

10) $\dfrac{3x+2-3x(\ln x)}{x(3x+2)^2}$ 11) $\dfrac{1}{x(\ln 3)}$ 12) $2x+4x(\ln x)$

13) $\dfrac{2(x+3-x\ln x)}{x(x+3)^2}$ 14) $\dfrac{e^{3x+1}(1+3x\ln(3x))}{x}$

15) $4\left(5x^2+\ln(2x)\right)^3\left(10x+\frac{1}{x}\right)$ 16) $x=\dfrac{19}{7}$

17) $x=-1,\ x=\dfrac{4}{3}$ 18) $x=35$ 19) $x=0$ only

20) $x\approx 2.5932$

21) (a) $b^{3x}=212$ (b) $\ln 15=2x-1$ (c) $\log_5 w=2-x$

(d) $\log_4 2=\frac{1}{2}$

22) $\ln 35.6\approx 3.5723,\quad e^{2.3}\approx 9.97418$ 23) ≈ 2.5789

24) $2x+y$ 25) $\log_4 64=3,\quad \log_3\left(\frac{1}{9}\right)=-2$

26) $2+\log_4 p-\frac{1}{2}\log_4 q$ 27) $m=2e\quad y=(2e)x-e$

28) increasing: $(-\infty,-2),\left(\frac{2}{3},\infty\right)$ 29) never increasing

30) relative maximum of 25 at $x=-2$, relative minimum of -2 at $x=1$

31) relative maximum of $\dfrac{1}{4e}$ at $x=e^{1/2}$ 32) $f''(x)=54x+\dfrac{4}{x^3}$

33) $g''(x) = \dfrac{80}{(4x+3)^3}$

34) $f''(x) = 4 - 30x + \dfrac{6}{x^4}, \quad f''(1) = -20, \quad f''(5) = -145.9904$

35) Number of units to produce maximum revenue is 83,333 units.
Maximum revenue is approximately $1,716,770.73.

36) concave upward: $(-\infty, -4)$ concave downward: $(-4, \infty)$

37) (a) relative minimum at point $P_1(1, -4)$ (b) relative maximum at point $P_2(3, 0)$
(c) point of inflection at point $P_3(2, -2)$

38) At hour 4, the number of bacteria is at a maximum.
That maximum value is 1160 million.

39) The concentration is at a maximum in about 3.5 hours.
That concentration is about 0.22%.

40) (a) $v(t) = 256 - 32t, \quad v(2) = 192$ feet per second
(b) $a(t) = -32$ feet per second^2
(c) maximum height is 1024 feet. (d) 16 seconds

41) (a) $13,847.84 (b) $13,909.68
(c) interest when compounded quarterly is about $3878.45.

42) The prediction from the model (function *A*) fell about 93 million short of the actual world population in the year 2000.