Answers to Review Document for Exam 3, Fall 2012

1) Vertical asymptotes: $x = 2$ and $x = 3$
   Horizontal asymptote: $y = 0$ (x-axis)

2) Vertical asymptotes: $x = -2$, $x = 5$
   Horizontal asymptote: $y = \dfrac{3}{2}$

3) Vertical asymptote: $x = \dfrac{1}{5}$
   No horizontal asymptote

4) $x = -4$ 5) $x = -11$

6) $x = 0,\ x = \dfrac{1}{2}$

7) $7145.51   8)   approximately 5.6 years

9) $\log_4 2 = 0.5$

10) $\ln 35.6 \approx 3.5723$ $e^{2.3} \approx 9.9742$

11) $\log_3 17 \approx 2.5789$

12) $x = 35$ 13) $x = 0$ only

14) $c \approx 2.5932$

15) $\log_b 20 = 2x + y$ 16) $\log_4 64 = 3,\quad \log_3 \dfrac{1}{9} = -2$

17) $2 + \log_4 p - \dfrac{1}{2}\log_4 q$

18) (a) $-\dfrac{3}{5}$ (b)   0

19) $y' = -28e^{2x}$

20) $f'(x) = 2xe^{-3x}(3x - 2)$

21) $y' = \dfrac{1 - \ln(2x+6)}{(x+3)^2}$

22) $y' = 3(x^3 + e^{2x})^2(3x^2 + 2e^{2x})$

23) $f'(x) = \dfrac{e^x[x(x^2 + 2x + 2)(\ln x) - (x^2 + 2)]}{x(\ln x)^2}$

24) slope of tangent line $= 2e$ equation of tangent line: $y = (2e)x - e$

25 (a) increasing: $(-\infty, -2) \cup \left(\dfrac{2}{3}, \infty\right)$ (b) increasing: never

26) relative maximum: $f(-2) = 25$, relative minimum: $f(1) = -2$

27) relative maximum: $g(e^{1/2}) = \dfrac{1}{4e} \approx 0.09197$

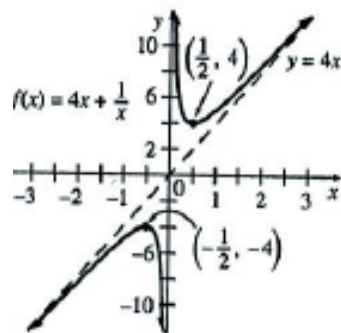28) $f''(x) = \dfrac{2(27x^4 + 2)}{x^3}$

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

30) $f''(2) = \dfrac{-445}{8}$ or -55.625, $f''(5) = \dfrac{-91244}{625}$ or -145.9904

31) $D = (-\infty, \infty)$,   no intercepts,   no horizontal asymptote, vertical asymptote: $x = 0$

Increasing: $(-\infty, -\frac{1}{2}) \cup (\frac{1}{2}, \infty)$, decreasing: $\left(-\frac{1}{2}, 0\right) \cup \left(0, \frac{1}{2}\right)$

Relative maximum at point $(-\frac{1}{2}, -4)$, Relative minimum at point $\left(\frac{1}{2}, 4\right)$

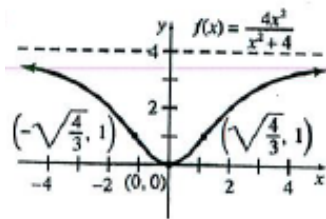Concave downward: $(-\infty, 0)$, Concave upward: $(0, \infty)$, no inflection points

Graph:

32) $D = (-\infty, \infty)$, intercept: $(0, 0)$ no vertical asymptote(s), horizontal asymptote: $y = 4$
Increasing: $(0, \infty)$ Decreasing: $(-\infty, 0)$ relative minimum $(0, 0)$

Concave downward: $\left(-\infty, -\sqrt{\frac{4}{3}}\right) \cup \left(\sqrt{\frac{4}{3}}, \infty\right)$ Concave upward: $\left(-\sqrt{\frac{4}{3}}, \sqrt{\frac{4}{3}}\right)$

Points of inflection: $\left(-\sqrt{\frac{4}{3}}, 1\right)$ and $\left(\sqrt{\frac{4}{3}}, 1\right)$

Graph: