Math 129 Answers to Supplementary Problems

1(a) $18/x^9$ (b) $\frac{25}{3}x^3y^4$ (c) $4x^4$

(d) $\frac{xy}{x+y}$ (e) $\frac{5(\sqrt{7}+2)}{3}$ (f) $\frac{x-2\sqrt{x}}{x}$

2. (a) $6x^2-17x+15$ (b) $\frac{2(2x^2+5x+5)}{x(x+2)(x+5)}$

(c) $\frac{1}{(x+2)(x-1)}$

3. (a) $(5t-2)(5t+2)$ (b) $6x(2x-3)(x+1)$

4. (a) $x=\frac{5\pm\sqrt{13}}{2}$ (b) $x=\frac{4\pm\sqrt{7}}{3}$ (c) $x=\frac{7\pm\sqrt{145}}{12}$

(d) $t=8$ (e) $x=24$ (f) $-3<x\leq 6$ or $(-3,6]$

(g) $x=-\frac{38}{9}$ (h) $x\leq -2$ or $x\geq 4$

5. line thru A+B: $y+5=3(x-4)$ or $y=3x-17$

y-intercept $=-17$, x-intercept $=\frac{17}{3}$

perpendicular line: $y+5=-\frac{1}{3}(x-4)$ or $y=-\frac{1}{3}x-\frac{11}{3}$

y-intercept $=-\frac{11}{3}$, x-intercept $=-11$

6. $y+1=\frac{2}{5}(x-3)$

7. (a) 5 (b) $3t^2-6t-8$ (c) all real numbers

(d) $\{x\mid x\geq -\frac{3}{2}\}$ or $[-3/2,\infty)$

(e) $\{x\mid x\neq \pm 3\}$ (f) $6x+3h$ (g) $6x+14$

7h) $\sqrt{6x^2+13}$

8. $36,000

9. (a) $C(x) = 12,000 + 15x$

(b) $R(x) = 18x$

(c) $P(x) = 3x - 12,000$

(d) $x = 4,000$ units/mo.

(e) $x = 9,000$ units/mo

10 (a) $y = 4(x - 3/2)^2 - 4$

(b) $V = (3/2, -4)$

(c) $(\frac{1}{2}, 0)$ and $(5/2, 0)$

(d) $x = 3/2$

11. $p = 125$. Maximum because $y = R(p)$ is a concave-down parabola with maximum at vertex

12 (a) $4\ln(x+1) - \ln(x^2+5)$, $x > -1$

(b) $2\ln x + x$, $x > 0$

13 a) $x = -5$ b) $x = \frac{1}{9}$ (c) $x = \frac{1}{3} + \frac{1}{3}\ln 5$

d) $x = 2$

14 a) $x = \frac{3\ln 3}{\ln 5} \approx 1.292030$

b) $x = \frac{\ln 6}{\ln 3} \approx 1.630930$

14 c) $x = \ln(3/2) \approx 0.405465$

d) $x = \frac{2}{3} - \frac{1}{3}\ln\left(\frac{19}{3}\right) \approx 0.051391$

15. a) $x = -\frac{\ln 27}{\ln 8} \approx -1.584963$

b) $x = 5$ (c) $x = 146$ (d) $x = \frac{1}{\log 5} \approx 1.430677$

e) $x = 3$ f) $x = 3/2$ g) $x = 2$

h) $x = 5$ i) $x = \frac{1}{2}\frac{\ln 30}{\ln 5} - \frac{1}{2} \approx 0.556641$

k) $x = \ln 2 \approx 0.693147$ l) $x = \pm\sqrt{\frac{\ln 25}{\ln 2}} \approx \pm 2.154960$

m) $x = \frac{1}{2} + \frac{1}{2}\ln\frac{32}{5} \approx 1.428149$

16. (a) (i) $V(t) = 100{,}000 - 5{,}000t$

(ii) \$50,000

b) i) $V(t) = 100{,}000\,(0.947268)^t$

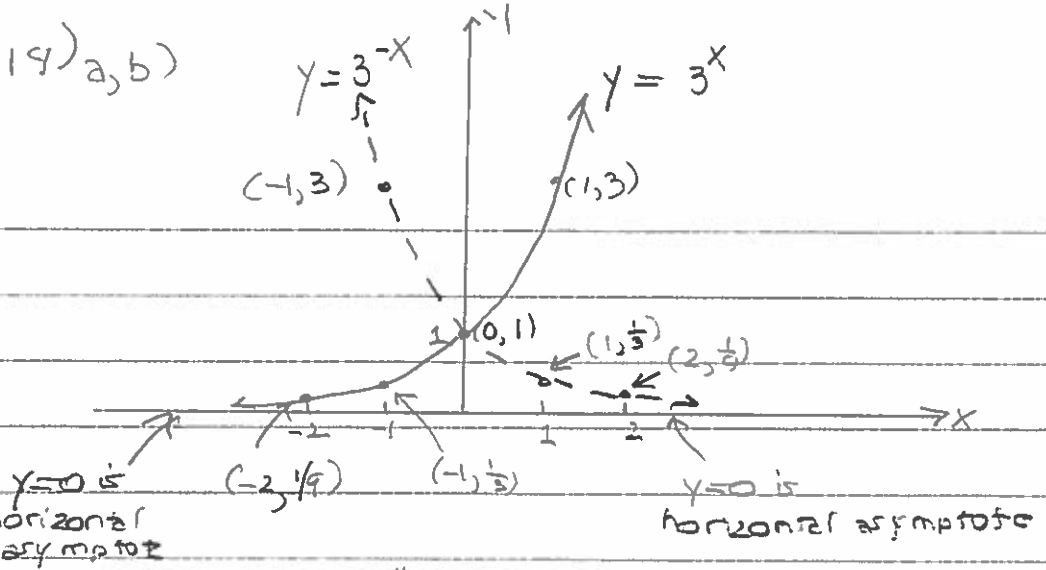
ii) \$58,174.11

iii) 5.273275

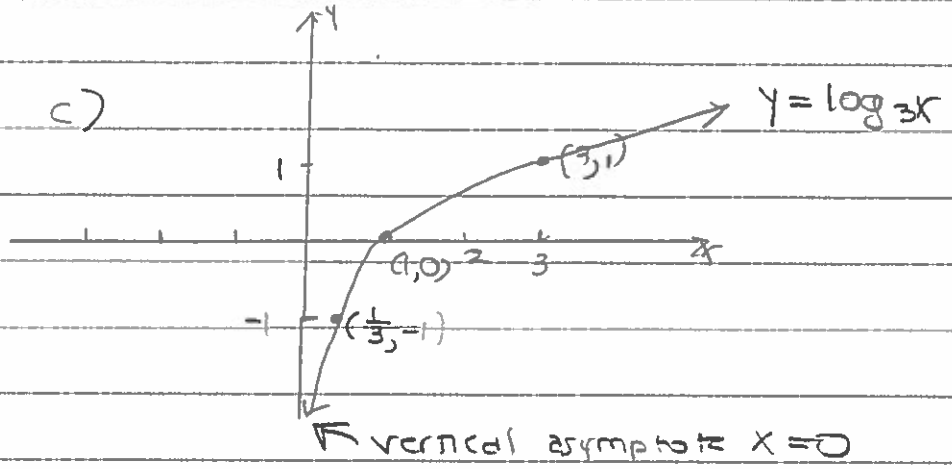
17. a) 8,748.5 yr ago b) 5,726 yr

18. (a) $N(t) = 400e^{0.0405465t}$ (b) 17.10 yr

19) a, b)



c)



20. (a) annual growth factor = 1.0201505 ← better for investor
(b) " " " 1.0199973

21. 13.56612 yr $\left(= \frac{\ln 1.5}{4 \ln 1.0075}\right)$

22. $\frac{\ln 1.5}{0.03} = 13.5155$ yr

23. $908.31

24. $FV_2 = \$12,736.17$ from monthly payments
$FV_2 = \$11,273.62$ from inital \$10,000
total = $FV_1 + FV_2 = \$24,009.79$ after 5 yr

25. $R = \$162.36$ payment per month

interest = sum of payments − principal

$= 29{,}224.32 - 20{,}000 = \$9{,}224.32$ interest

26. $x = 1,\ y = -1,\ z = 2$

27. (a) $\begin{bmatrix} 6 & -9 \\ 24 & -3 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & 1 \\ 10 & 2 \end{bmatrix}$

(c) $\begin{bmatrix} 10 & 4 & 14 \\ 8 & 3 & 10 \end{bmatrix}$ (d) not defined

(e) $\begin{bmatrix} 3 & -4 \\ -2 & 3 \end{bmatrix}$ (f) $\begin{bmatrix} 9 & -2 & -3 \\ -3 & 1 & 1 \\ -5/2 & 1/2 & 1 \end{bmatrix}$

28 (a) no solution since bottom row all zeros on left = non-zero on right

(b) An infinite number of solutions, in terms of parameter t. Let $z = t$. Then $x = 3 - 2t$, $y = 2t + 2$, where t may have any value