2005 Final Exam
Answers for Part I

1. A

2. D

3. E

4. 14

5. $\left(-\sqrt[4]{9}, \sqrt[4]{9}\right)$ or $\left(-\sqrt{3}, \sqrt{3}\right)$

6. $\left(3^{x+h} - 3^{x}\right)/h$

7. E

8. $y = \dfrac{3}{2\pi}x + \dfrac{5}{4}$

9. C

10. $C(p) = \dfrac{32 - 2.5p}{5.75}$

11. $y = -\dfrac{1}{2}\sin\left(\dfrac{\pi}{4}x\right) + 1$

12. C

13. $f^{-1}(x) = \dfrac{1}{2}\ln\left(\dfrac{x+1}{3}\right)$

14. 2

15. $0 \le t \le \dfrac{\sqrt{42}}{4}$

16. B

17. $\dfrac{\pi}{8}$

18. C

19. $A = 250e^{-0.04t}$

20. -3

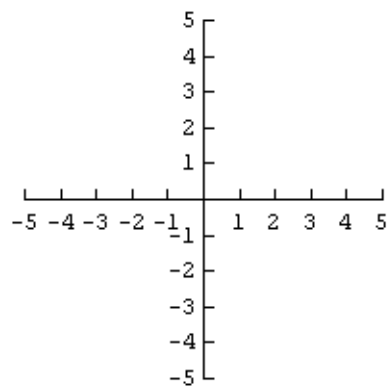
21. $g(t) = 2\cos\left[4(t+5)\right] + 3$

22. $f(x) = 3(x+2)^2(x-2)(x-1)$

23. D

24. 19,188 years

25.



2005 Final Exam
Solutions for Part II

1. a. $e^{0.045} = 1.0460 \to \text{EAY} = 4.6\%$

   b. $3 = e^{0.045t} \to \ln 3 = 0.045t \to t \approx 24.4\text{yrs}$

   c. $5049.29 = 4000\left(1+\dfrac{r}{365}\right)^{(365)(5)} \to r = 0.047$

   $\text{EAY} = \left(1+\dfrac{0.047}{365}\right)^{365} = 1.048 \to \text{EAY} = 4.8\%.$

2. a. Using a graphing utility, $H = 50t + 99$

   b. $H(10) = 50(10) + 99 = 599.$ By extrapolating, we predict that there will be 599 hawks in year 10.

   c. $M(t) = 700{,}000e^{0.0156t}$

   d. Yes. $1200H(t) = M(t)$

   $1200(50t + 99) = 700{,}000e^{0.0156t}.$

   Using a graphing utility, $t \approx 12.$

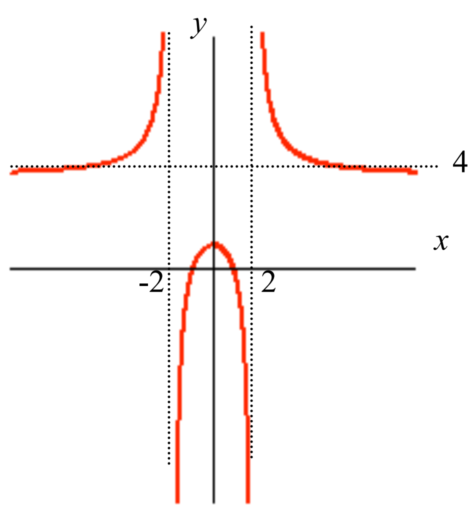
3. a. $C(t) = \dfrac{P(t)}{V(t)} = \dfrac{65 + 350t^2 + 6t^3}{120t^3 + 3t^2 + 275t + 650}$

   b. $P(0) = 65$ and $P(5) = 9565 \to \text{Avg.change} = \dfrac{P(5)-P(0)}{5-0} = \dfrac{9500}{5} = 1900\,\text{million ft}^3\text{per year.}$

   c. $C(0) = \dfrac{65}{650} = 0.1 = 10\%.$

   d. As $t \to \infty$, $C(t) \to \dfrac{6}{120} = 0.05 = 5\%.$

4. A. 1.



2.
$y = \dfrac{4(x-1)(x+1)}{(x-2)(x+2)}$

B. 1. p is larger, since as $x \to \infty$ f rises faster than g.

2. b is larger. Notice that at $x = 1$, $g(x) > f(x)$.

5. A. 1. $d_1 = 6 + 4\cos(0)e^0 = 10$. $d_2 = 5 + 3\cos(0)e^0 = 8$.

2. As t goes to infinity, $6 + 4\cos(\pi t)e^{-t} \to 6$ and $5 + \cos(2\pi t)e^{-t} \to 5$.

3. Using a graphing utility, $t \approx 0.40$

B. 1. Since $12 = \dfrac{2\pi}{b} \to b = \dfrac{\pi}{6}$. Also $62 - 22 = 40$. Therefore, $A(t) = 42 - 20\cos\left(\frac{\pi}{6}t\right)$

2. Using a graphing utility, $t \approx 3$ *and* $t \approx 11$.

6. a. Sometimes
   b. Never
   c. Always
   d. Never
   e. Sometimes
   f. Always
   g. Sometimes
   h. Never
   i. Sometimes
   j. Always