Final Exam Practice

ANSWERS

1. (a) -5
   (b) $\left\langle -\frac{2}{\sqrt{13}}, \frac{3}{\sqrt{13}} \right\rangle$
   (c) $\arccos\left(-\frac{9}{\sqrt{481}}\right)$
2. $\mathbf{r}(t) = \langle -1+3t, 1+4t \rangle$ (note that this parametrization is not unique)
3. $\left\langle \frac{3}{\sqrt{13}}, \frac{2}{\sqrt{13}} \right\rangle$
4. 90J
5. neither.
6. (a) $-\frac{\sqrt{3}}{2}$
   (b) 192
   (c) $\frac{1}{\sqrt{2}}$
7. (a) DNE ($-\infty$ as infinite limit)
   (b) $-\frac{1}{8}$
   (c) -1
   (d) 0.5
   (e) 1
   (f) -0.5
   (g) 5/3
   (h) 0
   (i) 0
   (j) -1
   (k) 1
   (l) e
8. $x = 4$
9. no vertical asymptotes; $y = 1$ and $y = -1$ are horizontal asymptotes
10. (a) 6/25
    (b) $y - 1 = \frac{6}{25}(x-2)$
11. (a) $(\ln 2)^5$
    (b) 32
12. $x < \ln 2$
13. (a) $\frac{1-2xy^3}{3x^2y^2+6y+4}$
    (b) $\frac{8x+\sin(x+2y)}{3y^2-2\sin(x+2y)}$
14. (a) $\frac{20(x+5)^3(125-x^3)}{(x^4+625)^2}$
    (b) $\frac{(\cos x - 1)\cos(x-\sin x)}{\sin^2(x-\sin x)}$
    (c) $-\frac{5x}{\sqrt{1-x^2}}\tan^4(\sqrt{1-x^2})\sec^2\sqrt{1-x^2}$
    (d) $-\tan x$
    (e) $-\frac{1}{2\sqrt{t-t^2}} + \frac{5}{1+25t^2}$
15. 2; 44
16. 56
17. $y = 1.5x + \ln 2$
18. $(-3, 0)$
19. $L(x) = 4 - \frac{3}{4}(x-3)$
20. $\frac{1}{2}\text{cm}^2/\text{min}$
21. $\frac{8}{9\pi}\text{cm/s}$
22. 13
23. (a) $\ln(\ln 2)$
    (b) $\frac{1}{e-1}$
    (c) 2/3
24. $x = t, y = e^2 + 3e^2t$.
25. increasing on $(-1,0)\cup(2,\infty)$;
    decreasing on $(-\infty,-1)\cup(0,2)$;
    local min at $x = -1, 2$; local max at $x = 0$.
26. $(0, \infty)$
27. $\max_{[-5,1]} f(x) = f(-2) = 21$; $\min_{[-5,1]} f(x) = f(-5) = -60$
28. $2\sqrt{x} + \frac{8}{3}x\sqrt{x}$
29. $x - 2\cos x - \sin x + 5$
30. (a) 24/25
    (b) $-\pi/4$
31. $4\sqrt{\frac{2}{3}} \times \frac{16}{3}$
32. (a) $\frac{1}{2}$
    (b) $-\frac{\sin x}{2}$
33. (a) 1209/28
    (b) $b^4/4 + 2b^2 - b$
    (c) 146/15
    (d) -3.5
34. 24