Exam Practice Problem Solutions

1. h
2. f
3. c
4. e
5. f
6. f
7. g
8. c
9. c
10. f
11. $xe^x + 37e^x$
12. d
13. d
14. g
15. c
16. b
17. b
18. c
19. d
20. g
21. c
22. c
23. h
24. $\left[\frac{2}{x} - \tan x - \frac{2x}{x^2+4} - \frac{1}{x-1} - \frac{1}{x \ln x}\right] \left(\frac{x^2 \cos x}{(x^2+4)(x-1) \ln x}\right)$
25. 3/8
26. g
27. g
28. g

29. a

30. f

31. b

32. h

33. h

34. $x \sin x - 36 \cos x$

35. $\frac{48}{25\sqrt{25^2-12^2}}$

36. $x = 2$. (Be careful about signs; $x = 6$ is *not* a critical point, so $x = 2$ is the only critical point.) Use the first derivative test to see that this is optimal: when $x < 2$, say $x = -100$, the derivative is clearly negative, while when $x > 2$, say $x = 100$, the derivative is clearly positive. So $x = 2$ is the unique local minimum.)

37. -6

38. *i* is f, *ii* is f', *iii* is f'' (note that the exam required an explanation)

39. 3/4

40. $y - 1/2 = \frac{\sqrt{2}}{3}(x - \sqrt{2}/2)$

41. $x = 60$, $y = 80$. The second derivative is easy to find, and positive when x is positive.

42. 0 is the only critical point. There are no local minima or maxima (the function is not even defined at $f(x)$).

43. c

44. You need $g(x)$

45. (a) ± 1
    (b) $(-\infty, -1)$ and $(1, \infty)$
    (c) $(0, \infty)$