1. (a) There is a vertical asymptote at $x = 1$.
   (b) The horizontal asymptote is at $y = 1$.
   (c) $f$ is never increasing.
   (d) $f$ is decreasing on the intervals $(-\infty, 1)$ and $(1, \infty)$.
   (e) $f$ is concave up on $(1, \infty)$.
   (f) $f$ is concave down on $(-\infty, 1)$.
   (g) You can sketch the graph easily from this information...

2. Let the box have base $x \times x$ and height $y$.

   (a) The surface area is then $S = x^2 + 4xy$; but the volume is 32 and $V = x^2 y$. Thus $y = 32/x^2$, and so we get $S = x^2 + 4/(32x) = x^2 + 1/(8x)$.

   (b) The surface area is minimized when $x = (1/16)^{\frac{1}{3}}$ (where $S' = 0$) and so $y = 32/x^2 = 32/16^{\frac{2}{3}}$.

3. Since $x + y = 60$ we can put $x = 60 - y$ and so we maximize $f(y) = (60 - y)y^2$ which occurs when $f'(y) = 0$ i.e. $y = 40$, so the answer is F.

4. $x_2 = (3/2) - (9/4 - 2)/3 = 3/2 - 1/12 = 17/12$, so the answer is F.

5. (a) $(3/5)x^{(5/3)} + 3x^{(1/3)} + C$
   (b) $e^x + (1/2)x^{-(1/2)} + C$
   (c) $-2\cos(x) + 3\sin(x) + C$
   (d) First notice that $f(x) = x + 1 + 1/x$, so the most general antiderivative is $(1/2)x^2 + x + \ln|x| + C$
   (e) $\tan(x) + C$

6. (a) $f(x) = \cos(x) + 4$
   (b) $f(x) = x^5 - 5x + 5$
   (c) $f(x) = (1/6)x^3 + (5/6)x + 1$

7. (a) $v(t) = 4t + 4$
   (b) $s(t) = 2t^2 + 4t + 2$
   (c) at $t = 7$
   (d) solving $s(t) = 50$ we find $t = 4$

8. $M_4 = (1/2)^2(1/2) + (3/2)^2(1/2) + (5/2)^2(1/2) + (7/2)^2(1/2) = (1 + 3 + 5 + 7)/8 = 2$

9. (a) $g'(x) = \sqrt{1 + 2x}$
   (b) $g'(x) = -\sin(x)$
   (c) $g'(x) = 2x\cos(x^2)$

10. (a) $x^3 + x^2 + 5x|_1^2 = (8 + 4 + 10) - (1 + 1 + 5) = 22 - 7 = 15$

(b) $x^{-1}|_1^2 = (1/2) - 1 = -1/2$

(c) $-\cos(t)|_0^{\pi/2} = -\cos(\pi/2) - (-cos(0)) = 0 + 1 = 1$

(d) $e^x|_0^1 = e - e^0 = e - 1$

(e) $\tan^{-1}(x)|_0^1 = \pi/4 - 0 = \pi/4$