Solutions to those not in textbook.

1. $y' + \frac{y}{x} = x y^2$ $\quad n = 2$ let $v = y^{1-2} = y^{-1}$

$y = \frac{1}{v}$ $\quad y' = \frac{-1}{v^2} v'$

$-\frac{1}{v^2} v' + \frac{1}{x v} = x \frac{1}{v^2}$

$-v' + \frac{1}{x} v = x$

$v' - \frac{1}{x} v = -x$ $\quad \mu = \frac{1}{x}$

$\frac{1}{x} v' - \frac{1}{x^2} v = -1$

$\left(\frac{1}{x} v\right)' = -1$

$\frac{1}{x} v = -x + c$

$v = -x^2 + cx$

$$\boxed{y = \frac{1}{cx - x^2}}$$

2. $y y' + y^2 = 2x$

$y' + y = \frac{2x}{y}$ $\quad n = -1$ $\quad v = y^{1-(-1)} = y^2$

$y = \sqrt{v}$

$y' = \frac{1}{2} v^{-\frac{1}{2}} v'$

$\frac{1}{2} v^{-\frac{1}{2}} v' + v^{\frac{1}{2}} = 2x v^{-\frac{1}{2}}$

$v' + 2v = 4x$ $\quad \mu = e^{\int 2x}$

$e^{2x} v' + 2e^{2x} v = 4x e^{2x}$

$(e^{2x} v)' = 4x e^{2x}$

$e^{2x} v = 2 \int 2x e^{2x} 2 dx$

$u = 2x$

2. cont $\int ue^u du = (u-1)e^u + C$

$e^{2x}v = (2x-1)e^{2x} + C$

$v = 2x + 1 + Ce^{-2x}$

$$\boxed{y = \pm\sqrt{2x+1+Ce^{-2x}}}$$

3. $y' + 3y = y^7 \cdot \sin(x)$

$n = 3$

$v = y^{1-3} = y^{-2}$

$y = v^{-\frac{1}{2}}$

$y' = -\frac{1}{2}v^{-\frac{3}{2}}v'$

$-\frac{1}{2}v^{-\frac{3}{2}}v' + 3v^{-\frac{1}{2}} = v^{-\frac{3}{2}}\sin x$

$v' - 6v = -2\sin x$

$\mu = e^{-6x}$

$e^{-6x}v' - 6e^{-6x}v = -2e^{-6x}\sin x$

$(e^{-6x}v)' = -2e^{-6x}\sin x$

$= \frac{e^{-6x}\cos x + 6e^{-6x}\sin x}{37} + C$

$v = -\frac{1}{37}\cos x - \frac{6}{37}\sin x + Ce^{6x}$

$v = y^{-2}$

$$y = \pm\sqrt{\frac{1}{-\frac{1}{37}\cos x - \frac{6}{37}\sin x + Ce^{6x}}}$$

2.2

32. (a) [2]
34. (b) [5]
38. (c) [3]

30 pts

Online (Bernoulli)

[3 x 10] 30 pts

2.6

2, 4, 10, 13, 16, 21 30 pts

[6 x 5]

Tot: 90 pts