3)

$+$	x	$\cos(5x)$
$-$	1	$\frac{1}{5}\sin(5x)$
$+$	0	$-\frac{1}{25}\cos(5x)$

4)

$+$	y	$e^{0.2y}$
$-$	1	$5e^{0.2y}$
$+$	0	$25e^{0.2y}$

5)

$+$	t	e^{-3t}
$-$	1	$-\frac{1}{3}e^{-3t}$
$+$	0	$\frac{1}{9}e^{-3t}$

6)

$+$	$x-1$	$\sin(\pi x)$
$-$	1	$-\frac{1}{\pi}\cos(\pi x)$
$+$	0	$\frac{-1}{\pi^2}\sin(\pi x)$

7)

$+$	x^2+2x	$\cos x$
$-$	$2x+2$	$\sin x$
$+$	2	$-\cos x$
$-$	0	$-\sin x$

8)

$+$	t^2	$\sin(\beta t)$
$-$	$2t$	$\frac{-1}{\beta}\cos(\beta t)$
$+$	2	$\frac{-1}{\beta^2}\sin(\beta t)$
$-$	0	$\frac{1}{\beta^3}\cos(\beta t)$

9) Use a property of logs first:

$$\ln(x^{1/3}) = \frac{1}{3}\ln(x)$$

Then: $\frac{1}{3}\int \ln x \, dx$ uses

& IBP:

$+$	$\ln(x)$	1
$-$	$1/x$	x

10)

$+$	$\sin^{-1}(x)$	1
$-$	$\frac{1}{\sqrt{1-x^2}}$	x

11)

$+$	$\tan^{-1}(4t)$	1
$-$	$\frac{1}{1+(4t)^2}\cdot 4$	t

12)

$+$	$\ln(p)$	p^5
$-$	$\frac{1}{p}$	$\frac{1}{6}p^6$

13)

+	t	$\sec^2(2t)$
−	1	$\frac{1}{2}\tan(2t)$

Then to integrate $\tan(2t)$, use u, du substitution.

14)

+	s	2^s
−	1	$\frac{1}{\ln 2} 2^s$
+	0	$\frac{1}{(\ln 2)^2} 2^s$

15)

+	$(\ln(x))^2$	1
−	$2\ln x \cdot \frac{1}{x}$	x

Then to integrate $\ln x$, use IBP again.

16) We haven't covered hyperbolic sine.

17) Integrate by parts twice to get the same integral on both sides of the equation;

+	$\sin(3\theta)$	$e^{2\theta}$
−	$3\cos(3\theta)$	$\frac{1}{2}e^{2\theta}$
+	$-9\cos(3\theta)$	$\frac{1}{4}e^{2\theta}$

18) Same as 17;

+	$e^{-\theta}$	$\cos(2\theta)$
−	$-e^{-\theta}$	$\frac{1}{2}\sin(2\theta)$
+	$e^{-\theta}$	$\frac{-1}{4}\cos(2\theta)$

19)

+	z^3	e^z
−	$3z^2$	e^z
+	$6z$	e^z
−	6	e^z
+	0	e^z

20) Use the identity:

$$\tan^2(x) = \sec^2(x) - 1$$

So:

+	x	$\tan^2(x) = \sec^2 x - 1$
−	1	$\tan(x) - x$

Then integrate $\tan(x)$ using u, du substitution.

7.1

21) Try letting $dv = \frac{1}{(1+2x)^2}\,dx$ and $u = xe^{2x}$

22) Try $u = (\sin^{-1}(x))^2$, $dv = dx$ (*)

23) Try $u = x$, $dv = \cos(\pi x)\,dx$

24) Initially, let $u = x^2+1$ $dv = e^{-x}dx$

25) Skip

26) Try $u = \ln y$, $dv = y^{-1/2}\,dy$

27) Let $u = \ln(r)$, $dv = r^3 dr$

28) Try $u = t^2$, $dv = \sin(2t)\,dt$

29) $u = y$, $dv = e^{-2y}dy$

30) Let $u = \tan^{-1}(\frac{1}{x})$, $dv = dx$ (then integrate $\int \frac{x\,dx}{1+x^2}$

31) $u = \cos^{-1}(x)$, $dv = dx$

32) $u = \ln(x)^2$ $dv = x^{-3}dx$

33) $u = \ln(\sin(x))$ $dv = \cos(x)$

34) Let $u = r^2$, $dv = \frac{r}{\sqrt{4+r^2}}$

35) Let $u = (\ln x)^2$, $dv = x^4 dx$

~~36)~~
37) Let $y = \sqrt{x}$, $dy = \frac{1}{2\sqrt{x}}\,dx = \frac{1}{2y}\,dx$

So $\int \cos\sqrt{x}\,dx = \int \cos(y)\,(2y)\,dy$

41) Let $\left.\begin{matrix} y = 1+x \\ dy = dx \end{matrix}\right\}$ $\int x \ln(1+x)\,dx = \underbrace{\int (y-1)\ln(y)\,dy}$

$+$	$\ln y$	$y-1$
$-$	$1/y$	$\frac{1}{2}y^2 - y$

Wait on this

(4#) (a) If $n=2$, $\int \sin^2(x)\,dx = \frac{1}{2}\cos(x)\sin(x) + \frac{1}{2}\underbrace{\int 1\,dx}_{=x}$

(b) $\int \sin^4(x)\,dx =$

63) $Vol = \int_{-1}^{0} 2\pi(1-x)e^{-x}\,dx$ etc

A 68)

$+$	$f(x)$	$g''(x)$
$-$	$f'(x)$	$g'(x)$
$+$	$f''(x)$	$g(x)$

$\Rightarrow f(x)\,g'(x)\Big|_0^a - f'(x)\,g(x)\Big|_0^a + \int_0^a f''(x)\,g(x)\,dx$

$\boxed{\text{70) Just do (a)}}$