6. Life = 7 × 5 × 49 × 4 = 6.86 khr
Comparing this with Code 26 khr at 8 hr/day:
hr/day = 8 × 6.86/26 = 2.1
But Code does not cater for such low values in the service factor table.
So use (5a).
Duty factor = 1.2 (heavy).
∴ P = 1.2 × 7.5 = 9.0 kW
Any of the solutions shown may be used – though it depends on whether lives < 4 years can be tolerated.

```
*********************
V-BELT DRIVE SELECTOR
*********************

title       : problem 6
design power                (kW) :    9.00
driving speed              (rpm) :    1445
driven speed limits        (rpm) :     860     870
centre distance limits      (mm) :     280     320
drive life limits          (khr) :     2.2    21.7
```

belt & number	pulley diameters mm	mm	driven speed rpm	belt speed m/s	belt length mm	cent-res mm	belt life khr	eff'ness %
SPZ 2	150	250	867	11.3	1250	307	19.2	72
A 3	150	250	867	11.3	1250	307	16.0	70
A 5	90	150	867	6.8	990	305	3.8	59
B 2	150	250	867	11.3	1210	286	7.4	57
SPZ 4	90	150	867	6.8	1000	310	12.6	55
A 6	90	150	867	6.8	990	305	11.5	54
SPZ 5	75	125	867	5.7	900	292	5.8	50
A 8	75	125	867	5.7	890	287	8.2	47
SPZ 6	75	125	867	5.7	900	292	16.8	45
SPZ 6	67	112	864	5.1	900	309	4.6	45
SPZ 8	67	112	864	5.1	900	309	19.6	38

* You should be competent enough to devise one such solution without the aid of the computer, but with the help of the Code compact diagram to indicate possible belt section.

7. Referring to the worked example we have

i) $t\hat{f} + s\check{f} = h_x$ i.e. (6)

ii) $\hat{f} - \check{f} = P/w\vartheta \equiv \nu$ i.e. (4a)

iii) $\hat{f} / \check{f} \le e^{(f\theta)}{}_{min} \equiv \tau$ i.e. (3)

in which we have for convenience defined a load parameter, ν, and max. tension ratio, τ.
For the case in hand, $\nu = 0.92$ at full load, when $\tau = 1.84$. From ii) & iii) therefore:

$\check{f} = 1.10$ $\hat{f} = 2.02$

[and so if required, from (6) $\hat{F} = \hat{f}.W/z + \rho v^2$
$= 2.02\,(7600/19.3)/3 + 28 = 425$ N]

Inserting these values of $\check{f}$, $\hat{f}$ into i) together with the expressions for s, t in terms of h_x, h_y from (vi), with $\phi = 90°$, $\gamma = 14.4°$ and $D_1 = 170$ mm:–

$(0.969\,h_x - 0.249\,h_y - 85) \times 2.02 + (0.969\,h_x + 0.249\,h_y + 85) \times 1.10 = h_x$ ... i.e.

a) $h_y = 8.85\,h_x - 342$ mm

This is the locus AP shown overleaf – it is the locus of possible hinge points corresponding to a load parameter of 0.92 at the point of slip when $\tau = 1.84$.
All hinges on AP result in the same tension/load variation shown also overleaf. This