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1 p139, #13g, §1 Asked

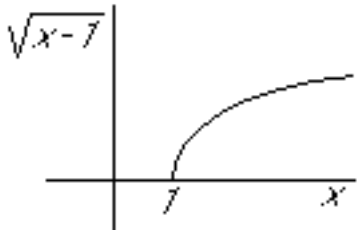
Asked: Graph

$$y = x\sqrt{x-1} \tag{1}$$

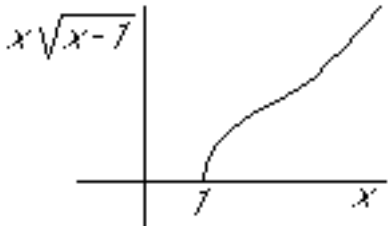
2 p139, #13g, §2 Solution

$$y = x\sqrt{x-1} \tag{2}$$

Factor $\sqrt{x-1}$ is $\sqrt{x}$ shifted one unit towards the right.



Multiplying by x magnifies it by a factor ranging from 1 to ∞:



Function $y(x)$:

- has an x-extent $x \geq 1$ and a y-extent $y \geq 0$;
- behaves asymptotically as $y \sim x^{3/2}$ for $x \to \infty$;
- is monotonous:

$$y' = \frac{\mathrm{d}y}{\mathrm{d}x} = \sqrt{x-1} + \frac{x}{2\sqrt{x-1}} = \frac{2x-2+x}{2\sqrt{x-1}} = \frac{3x-2}{2\sqrt{x-1}} > 0;$$

- has vertical slope at $x = 1$;
- is concave down for smaller x, concave up for larger x;
- the inflection point is at

$$y'' = \frac{3x - 4}{4(x-1)^{3/2}} = 0$$

giving $x = 4/3$.