1 (a)

$$\lim_{t\to 0^+} \frac{t+4}{t^2+2t} \text{ "=" } \frac{4}{0}$$

So as t gets close to zero this looks like $\frac{4}{\text{small pos number}}$. The limit is ∞.

(b) $$\lim_{t\to 0^+}\left(\frac{2}{t} - \frac{t+4}{t^2+2t}\right)$$

$$= \lim_{t\to 0^+}\left(\frac{2t+4}{t^2+2t} - \frac{t+4}{t^2+2t}\right)$$

$$= \lim_{t\to 0^+} \frac{1}{t+2}$$

$$= \frac{1}{2}$$

(c) Nothing can be said about what $\infty - \infty$ should equal ("indeterminate form"). Applying the difference law to (b) would give $\infty - \infty$, but we saw the limit is $\frac{1}{2}$.

2. $$\lim_{x\to\infty}\left(\sqrt{x^2-2x} - x\right) \cdot \frac{\sqrt{x^2-2x}+x}{\sqrt{x^2-2x}+x}$$

$$= \lim_{x\to\infty} \frac{(x^2-2x) - x^2}{\sqrt{x^2-2x}+x}$$

$$= \lim_{x\to\infty} \frac{-2x}{\sqrt{x^2-2x}+x} \cdot \frac{\frac{1}{x}}{\frac{1}{x}}$$

$$= \lim_{x\to\infty} \frac{-2}{\sqrt{\frac{1}{x^2}(x^2-2x)}+1}$$

$$= \lim_{x\to\infty} \frac{-2}{\sqrt{1-\frac{2}{x}}+1}$$

$$= \frac{-2}{\sqrt{1}+1}$$

$$= -1$$