9 (a) $d = \int_1^\infty y^{-3} dy = \frac{-y^{-2}}{2}|_1^\infty = 1/2 \Rightarrow d = 2.$

(b) $\mathbb{E}(X) = \int_1^\infty 2y^{-2} dy = -2y^{-1}|_1^\infty = 2$

(c) $\mathbb{E}(X^2) = \int_1^\infty 2y^{-1} dy = \log y|_1^\infty \to \infty$ and hence, the variance is not finite.

12 Note that $\mathbb{E}(X) = M'(0)$, $\mathbb{V}(X) = \mathbb{E}(X^2) - \mathbb{E}(X)^2 = M''(0) - M'(0)$, and that $M(0) = 1$.

(a) $R'(0) = M'(0)M(0)^{-1} = M'(0)$

(b) $R''(0) = M''(0)M(0)^{-1} - M'(0)M(0)^{-2}M'(0) = M''(0) - M'(0)^2$

18 This is easiest if we first find the Cumulative Distribution Function. $F(x) = \int_{-1}^x (s + 1)/2 ds = (s + 1)^2/4|_{-1}^x = (x + 1)^2/4$. π_p is found by solving for x in $F(x) = \pi_p$.

```
2*sqrt(.64) - 1                          # a

## [1] 0.6

2*sqrt(.25) - 1                          # b

## [1] 0

2*sqrt(.81) - 1                          # c

## [1] 0.8
```