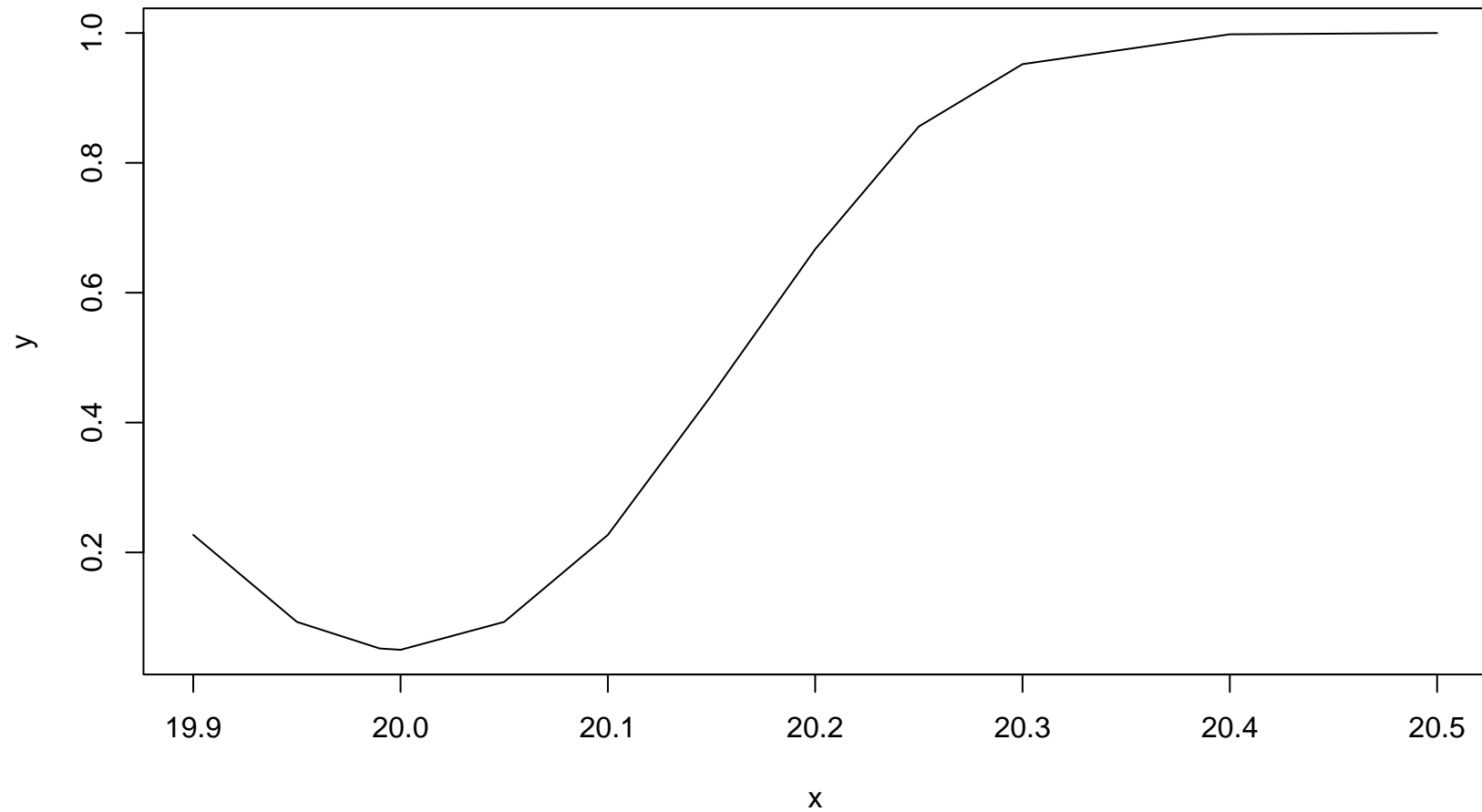


Problem 1.2: Sketch of Power Curve



Read H.O.12, Devore Book Chp 8.

1.)

$$1.1) \left| \frac{\sqrt{n}(\bar{y} - 20)}{s} \right| > t_{\alpha/2} \quad H_0: \mu = 20, \quad H_1: \mu \neq 20$$

$$1.2) G(-t_{\alpha/2}) + 1 - G(t_{\alpha/2})$$

$$\cdot y(19.9) = 0.227, \quad y(19.95) = 0.093, \quad y(19.99) = 0.052$$

$$\cdot y(20) = 0.05, \quad y(20.05) = 0.093, \quad y(20.1) = 0.227, \quad y(20.15) = 0.442$$

$$\cdot y(20.2) = 0.697, \quad y(20.25) = 0.856, \quad y(20.3) = 0.952,$$

$$\cdot y(20.4) = 0.998, \quad y(20.5) = 0.99998$$

* see end of pdf for sketch of power curve.

$$1.3.) \text{power.t.test}(n = , \text{delta} = 0.15, \text{sd} = 0.43, \text{sig.level} = 0.05, \text{power} = 0.8, \\ \text{type} = c("one.sample"), \text{alternative} = c("one.sided"))$$

$$\Rightarrow n = 53$$

2)

$$2.1) H_0: \mu_0 = 10 \quad H_1: \mu_0 < 10, \quad \bar{y} = 8.7, \quad s = 2, \quad n = 15, \quad \alpha = 0.01$$

$$T = \frac{\sqrt{15}(\bar{y} - 10)}{s} = -2.52$$

$$p\text{-value} = pt(T, n-1) = 0.012$$

* There is not sufficient evidence to reject the null using $\alpha = 0.01 < p\text{-value} = 0.012$

$$2.2) \Delta = \frac{\sqrt{15}(11.5 - 8.5)}{2} \quad y(\mu) = 0.616$$

$$2.3) \text{ looking at H.O.12, pg 29 Table A11 we see} \\ n = 27$$

3.)

(3.1) $TS = 9.2$, $p\text{-value} = 0.00287$, here is significant evidence ($\alpha = 0.10$) that the standard deviation from the insurance is less than 10.

(3.2) * see R for computation:

$$y(5) = 0.00002687706, y(6) = 0.008725504, y(7) = 0.1280751$$

$$y(8) = 0.4351858, y(9) = 0.7340757, y(10) = 0.90.$$

* ask about this

(3.3) $\sqrt{\frac{(n-1)s^2}{\chi^2_{\alpha/2}}} \Rightarrow \text{in R: } \text{sqrt}(((\text{length}(x)-1)^* \text{var}(x))/qchisq(0.5, \text{length}(x)-1)) = \underline{8.151741}$

4.)

(4.1) see R for computation:

$$s_+ = 10, pbinom(s_+, \text{length}(x), 0.5) = 0.2121751 \Rightarrow \text{fail to reject null.}$$

$$qbinom(0.05, \text{length}(x), 0.5) = 8 > 10 = s_+ \Rightarrow \text{fail to reject null.}$$

(4.2) see R for computation:

$$w_{n, 1-\alpha} = \text{qsignrank}(x, n, True) = 101 < w_+ = 112.5; p\text{-value} = 0.09540713$$

\Rightarrow fail to reject null.

(4.3) $\bar{y} + t_{\alpha/2} \frac{s}{\sqrt{n}} \Rightarrow 118 + 1.711 \frac{sd(x)}{\sqrt{25}} = 120.519.$

5.)

* see R for computation

(5.1) $(0.18668265, 0.9731735)$

(5.2) Yes, there is significant evidence that the improved method has increased the accuracy over the current method as the old accuracy 0.80 is below the lower bound of 95% CI for the accuracy of the new method.

(5.3) $y(0.75) = 0.03762626, y(0.80) = 0.27118896, y(0.85) = 0.67246294$
 $y(0.90) = 0.96010947, y(0.95) = 0.9986415$

(5.4) see R for calculation: $n = 83$

6) (6.1) A

(6.2) C

(6.3) C

(6.4) B

(6.5) B

(6.6) C

(6.7) A

(6.8) B

(6.9) B