20. (a) Plugging $R_h = 2GM_h/c^2$ into the indicated expression, we find

$$a_g = \frac{GM_h}{(1.001R_h)^2} = \frac{GM_h}{(1.001)^2\left(2GM_h/c^2\right)^2} = \frac{c^4}{(2.002)^2 G}\frac{1}{M_h}$$

which yields $a_g = \left(3.02 \times 10^{43}\,\text{kg}\cdot\text{m/s}^2\right)/M_h$.

(b) Since M_h is in the denominator of the above result, a_g decreases as M_h increases.

(c) With $M_h = \left(1.55 \times 10^{12}\right)\left(1.99 \times 10^{30}\,\text{kg}\right)$, we obtain $a_g = 9.8\ \text{m/s}^2$.

(d) This part refers specifically to the very large black hole treated in the previous part. With that mass for M in Eq. 14-15, and $r = 2.002GM/c^2$, we obtain

$$da_g = -2\frac{GM}{\left(2.002GM/c^2\right)^3}\,dr = -\frac{2c^6}{(2.002)^3(GM)^2}\,dr$$

where $dr \rightarrow 1.70$ m as in the Sample Problem. This yields (in absolute value) an acceleration difference of $7.3 \times 10^{-15}\ \text{m/s}^2$.

(e) The miniscule result of the previous part implies that, in this case, any effects due to the differences of gravitational forces on the body are negligible.