$$= 4u^2\left(u+\sqrt{u^2+ab}\right)^2 + (a+b)^2\left(2u^2+2u\sqrt{u^2+ab}+ab\right)$$

$$= 4u^2\left(u+\sqrt{u^2+ab}\right)^2 + (a+b)^2\left(u+\sqrt{u^2+ab}\right)^2$$

$$= \left(u+\sqrt{u^2+ab}\right)^2\left(4u^2+(a+b)^2\right)$$

So we put this into the integral and get:

$$M(a,b) = 2\int_{-\infty}^{\infty} \frac{u+\sqrt{u^2+ab}}{\sqrt{u^2+ab}\,\sqrt{\left(u+\sqrt{u^2+ab}\right)^2\left(4u^2+(a+b)^2\right)}}\,du$$

$$= \int_{-\infty}^{\infty} \frac{2}{\sqrt{u^2+ab}\,\sqrt{4u^2+(a+b)^2}}\,du = M\left(\sqrt{ab}, \frac{a+b}{2}\right)$$

(d) $M(1,10) = M\left(\sqrt{10}, \frac{11}{2}\right) = M\left(\sqrt{\sqrt{10}\cdot\frac{11}{2}}, \frac{\sqrt{10}+\frac{11}{2}}{2}\right) = \dots$

In decimals:

M(	1,	10)
= M(	3.16228,	5.5)
= M(	4.17043,	4.33114)
= M(	4.25003,	4.25079)
= M(	4.25041,	4.25041)

$= \pi/4.25041 = \underline{\underline{0.739127}}$

now they are equal up to at least 5 digits