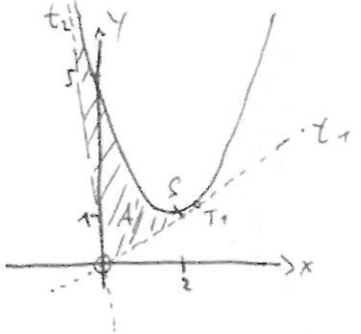
Pass H12 4h

1.



$X_S = -\frac{b}{2a} = 2$

$Y_S = 1$ $\quad S(2|1)$

$f'(x) = 2x - 4$

$m = f'(x)$

$\frac{y-0}{x-0} = 2x-4$

$\frac{x^2-4x+5}{x} = 2x-4$

$x^2-4x+5 = 2x^2-4x$

$\underline{x = \pm\sqrt{5}}$ $\quad y_1 = 10-4\sqrt{5}$
$\quad y_2 = 10+4\sqrt{5}$

$T_1(\sqrt{5}\,|\,10-4\sqrt{5})$ $\quad \underline{t_1:\ y = (2\sqrt{5}-4)x}$

$T_2(-\sqrt{5}\,|\,10+4\sqrt{5})$ $\quad \underline{t_2:\ y = -(2\sqrt{5}+4)x}$

$\underline{A} = A_1 + A_2 = \int_{-\sqrt{5}}^{0} (f - t_2)\,dx + \int_{0}^{\sqrt{5}} (f - t_1)\,dx$

$= \left[\frac{1}{3}x^3 - 2x^2 + 5x + (2\sqrt{5}+4)\frac{x^2}{2}\right]_{-\sqrt{5}}^{0} + \left[\frac{1}{3}x^3 - 2x^2 + 5x - (2\sqrt{5}-4)\frac{x^2}{2}\right]_{0}^{\sqrt{5}}$

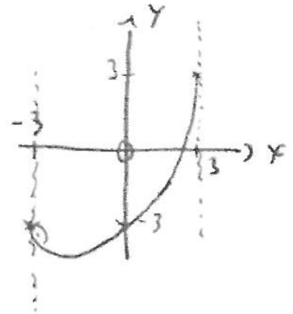
$= \frac{5\sqrt{5}}{3} + \frac{5\sqrt{5}}{3}$

$= \underline{\underline{\frac{10}{3}\sqrt{5}}}$

Pass H12

2. $9 - x^2 \geq 0$

$|x| \leq 3 \qquad \mathbb{D} = [-3;3]$



$x - \sqrt{9-x^2} = 0$

$x^2 = 9 - x^2$

$x = \pm\frac{3}{2}\sqrt{2}$ $\quad$ Probe: $\underline{x = \frac{3}{2}\sqrt{2}}$ NST

$f'(x) = 1 + \frac{x}{\sqrt{9-x^2}}$; $\mathbb{D}' =]-3;3[$

$f'(x) = 0$

$x = \pm\frac{3}{2}\sqrt{2}$ $\quad$ Probe $\underline{x = -\frac{3}{2}\sqrt{2}}$

$\underline{y = -3\sqrt{2}}$

VZT

x	$-2{,}5$	$-\frac{3}{2}\sqrt{2}$	-2
$f'(x)$	$-$	0	$+$
	↘	Min →	↗

$\underline{\text{Min}\left(-\frac{3}{2}\sqrt{2}\,|\,-3\sqrt{2}\right)}$

waag. Tangente

senkrechte Tangente: $x = \pm 3$, da dort f definiert, f' aber nicht, daher senkrechte Tangente

$\underline{\mathbb{W} = [-3\sqrt{2};3]}$

Pass H12

3. a)

M liegt auf Senkrechten n zu DA, durch Mitte DA

$M_{DA} = \begin{pmatrix} 4{,}5 \\ 4{,}5 \end{pmatrix}$

$\vec{DA} = \begin{pmatrix} 1 \\ -3 \end{pmatrix} \rightarrow \vec{n}_{DA} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$

$n: \vec{X} = \begin{pmatrix} 1{,}5 \\ 2{,}5 \end{pmatrix} + t\begin{pmatrix} 3 \\ 1 \end{pmatrix}$

$1{,}5 + 3t = 6$

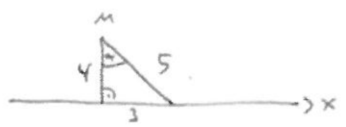
$t = 1{,}5$ $\quad\quad$ $\underline{M(6|4)}$

$y = 2{,}5 + 1{,}5 = 4$

$\vec{MC} = \vec{AM} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$ $\quad\quad$ $\vec{r}_C = \vec{r}_A + 2\vec{AM} = \begin{pmatrix} 10 \\ 7 \end{pmatrix}$ $\quad$ $\underline{\underline{C(10|7)}}$

$AM = 5$ $\quad\quad$ $\vec{r}_B = \vec{r}_C + \vec{DA} = \begin{pmatrix} 11 \\ 4 \end{pmatrix}$ $\quad$ $\underline{\underline{B(11|4)}}$

b)



$\tan\alpha = \frac{3}{4}$

$\alpha = 36{,}9°$

Kleines Segment: $A_1 = \frac{2\alpha}{360°} \cdot r^2\pi - \frac{1}{2} \cdot 6 \cdot 4$

$A_1 = 4{,}088$

größeres Segment: $\underline{\underline{A_2}} = A - A_1 = \pi r^2 - A_1$

$= \underline{\underline{74{,}45}}$

Pass H12

4. $f(x) = 0$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

NST. $\underline{x_1 = 2}$

$\underline{x_2 = -1}$

$f'(x) = \frac{(2x-1)(x-3) - (x^2-x-2)}{(x-3)^2}$

$= \frac{x^2 - 6x + 5}{(x-3)^2}$

$f'(x) = 0$

$(x-5)(x-1) = 0$

$x = 5$

$x = 1$

VZT

x	0	1	2	5	7
$f'(x)$	+	0	-	0	+

$\nearrow \rightarrow \searrow$ Max

$\underline{(1|1)}$

$p(x) = a \cdot (x-2)(x+1)$

$p(1) = 1 = a \cdot (-1)(2)$

$\underline{a = -\frac{1}{2}}$

$p(x) = -\frac{1}{2}(x-2)(x+1)$

$A_p = \int_{-1}^{2} p(x)\,dx = -\frac{1}{2}\left[\frac{1}{3}x^3 - \frac{1}{2}x^2 - 2x\right]_{-1}^{2} = \underline{\underline{\frac{9}{4} = 2{,}25}}$

$\frac{A_p - A}{A} = \underline{15\%}$

Pass H12

5 a)

1) $P(2b; 1g; \text{z.m.Z.}) = 3 \cdot \left(\frac{13}{20}\right)^2 \cdot \frac{7}{20} = \underline{44{,}4\%}$

2) $P(2b; 1g; \text{z.o.Z.}) = 3 \cdot \frac{13 \cdot 12 \cdot 7}{20 \cdot 19 \cdot 18} = \underline{47{,}9\%}$

b) $\underbrace{15 = 1+2+3+9 = 1+3+4+7 = \cancel{1+1+4+9} = \cancel{3+4+6+2} = 1+2+4+8 = 1+3+5+6 = 2+3+4+6 = \cancel{2+3} = 1+2+5+7}$

6 mit je $4 \cdot 3 \cdot 2 \cdot 1$ Ziehungsmöglichkeit

WS je $\frac{1}{10 \cdot 9 \cdot 8 \cdot 7}$

$P(\text{Summe der } 4 = 15 \text{ z.o.Z.}) = 6 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot \frac{1}{10 \cdot 9 \cdot 8 \cdot 7} = \underline{\underline{\frac{1}{35} = 2{,}86\%}}$

c) $10 + x$ blau, 10 gelbe

$P(bb, gg)_{\text{z.o.Z.}} > \frac{4}{5}$

$\frac{(10+x)(9+x)}{(20+x)(19+x)} + \frac{10 \cdot 9}{(20+x)(19+x)} > \frac{4}{5}$

$5x^2 + 95x + 900 > 4x^2 + 156x + 1520$

$x^2 - 61x - 620 > 0$

NST: $x = \cancel{}\ -8{,}9$ Parabel nach oben geöffnet,

$x = \cancel{}\ 69{,}9$ also links/rechts NST

$\underline{x \geq 70}$

Mindestens 70 blaue Kugeln dazu.

$\frac{80 \cdot 79}{90 \cdot 89} + \frac{10 \cdot 9}{90 \cdot 89} = \frac{641}{801} = 0{,}80025$ $\frac{641}{801} = \frac{3205}{4005}$

$\frac{4}{5} = 0{,}8$ $\frac{4}{5} = \frac{3204}{4005}$