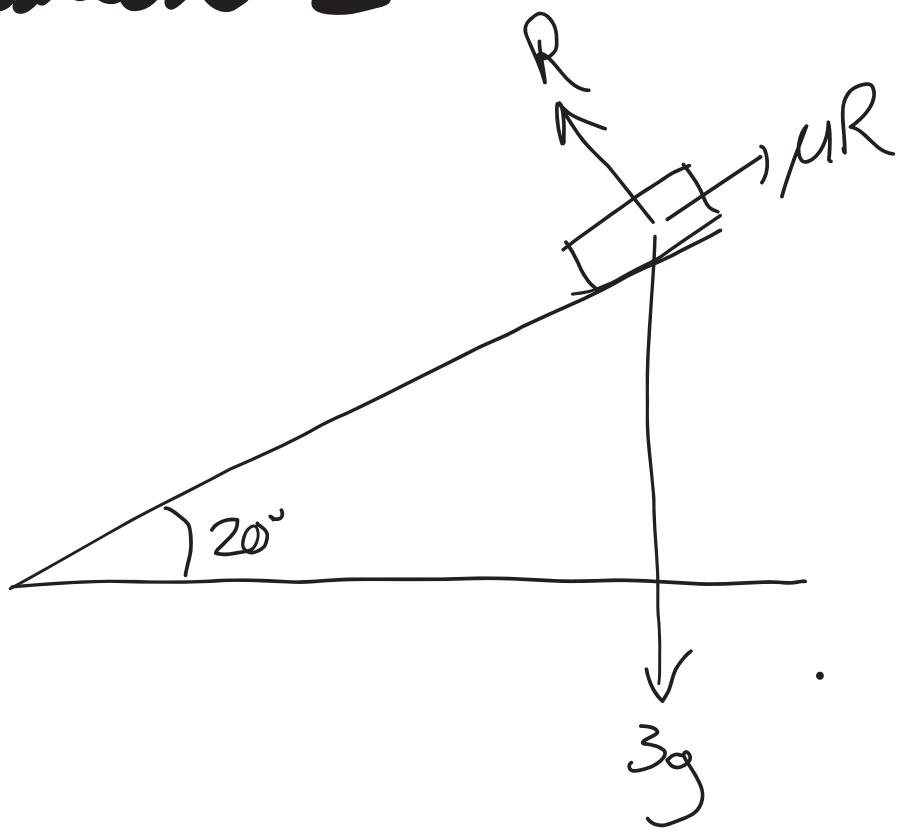
Question 2



Resolving forces ⊥ & //

$R = 3g\cos 20$

$\mu R = 0.1 \times 3g\cos 20$

$= 2.76N$

$3g\sin 20 = 10.06N$

$F = Ma$

$10.06 - 2.76 = 3a$

$a = 2.433$

$V = u + at$

$V = 0 + 2.433 \times 5$

$= 12.17 m/s$

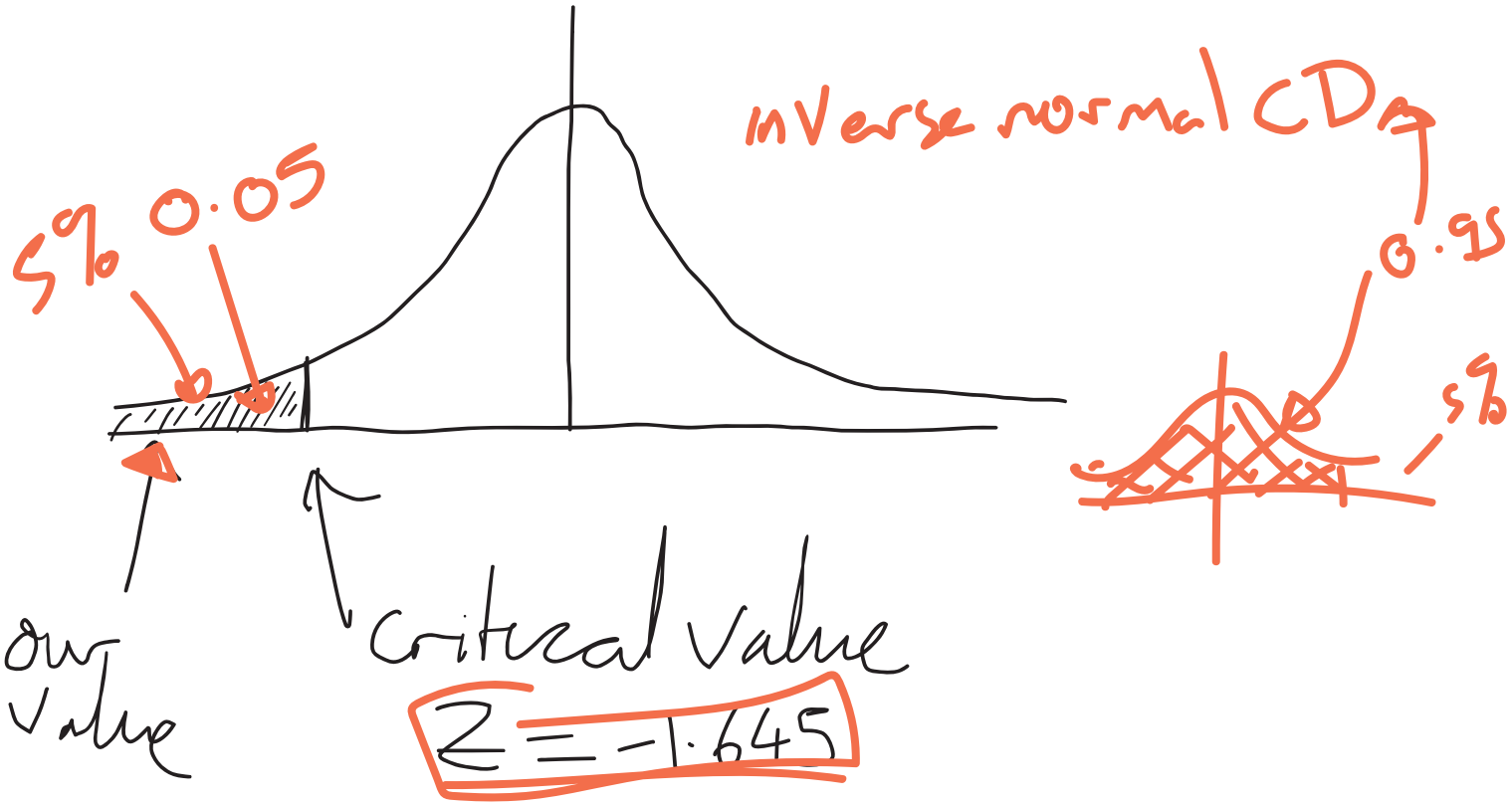
Question 3

$X \sim N(454, 2^2)$

$H_0 : \mu = 454$

$H_1 : \mu < 454$

$$z = \frac{\bar{x} - \mu}{\left(\frac{\sigma}{\sqrt{n}}\right)} = \frac{452 - 454}{\left(\frac{2}{\sqrt{30}}\right)} = -5.477$$



∴ At 5% level there is evidence to accept H_1, reject H_0

Question 4

1) 10 green
3 blue
2 red

$$P(\text{same}) = P(gg) + P(bb) + P(rr)$$
$$= \frac{10}{15} \times \frac{9}{14} + \frac{3}{15} \times \frac{2}{14} + \frac{2}{15} \times \frac{1}{14}$$
$$= \frac{99}{210} = \frac{33}{70}$$

2) $$P(B_2 | G_1) = \frac{P(G_1 \cap B_2)}{P(G_1)}$$
$$= \frac{\frac{10}{15} \times \frac{3}{14}}{\frac{10}{15}}$$
$$= 3/14$$

3) $$P(\neg G \cap \neg G) = \frac{5}{15} \times \frac{4}{14}$$
$$= \frac{2}{21}$$

Question 5

$$v(t) = \frac{d}{dt} r(t) = \begin{pmatrix} 3t^2 - 8t^3 \\ 2t \\ -8t \end{pmatrix}$$

$$v(4) = \begin{pmatrix} 3\times 4^2 - 8\times 4^3 \\ 2\times 4 \\ -8\times 4 \end{pmatrix}$$

$$= \begin{bmatrix} -464 \\ 8 \\ -32 \end{bmatrix}$$

Question 6

Particle has mass 3kg

force $\underline{F} = 3\underline{i} + 2\underline{j}$ $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$

$\therefore \quad \underline{a} = \underline{i} + \frac{2}{3}\underline{j}$

$\underline{v} = \underline{u} + \underline{a}t$

$= 0 + 10\left(\underline{i} + \frac{2}{3}\underline{j}\right)$

$= 10\underline{i} + \frac{20}{3}\underline{j}$ $\begin{pmatrix} 10 \\ 20/3 \end{pmatrix}$

* $\underline{s} = \underline{u}t + \frac{1}{2}\underline{a}t^2$

$\underline{s} = 0 + 50\underline{a}$

$= 50\underline{i} + \frac{100}{3}\underline{j}$ $\begin{pmatrix} 50 \\ 100/3 \end{pmatrix} = s$

$|\underline{s}| = \sqrt{50^2 + \left(\frac{100}{3}\right)^2} = \frac{50\sqrt{13}}{3}$

$= 60.09\,m$