Feedback of the midterm exam for MTH201

Question 1:

(1) Some of you didn't know $\nabla \cdot f$ is grad$f$ and $\nabla \times \boldsymbol{F}$ is the curl of $\boldsymbol{F}$.
(2) The second component of $\nabla \times \boldsymbol{F}$ was calculated as the opposite sign.
(3) Not only a few of you forgot to do part (C) of this question.
(4) The last component of $\boldsymbol{F}(\boldsymbol{r}(t))$ should be $1 - 4t^4$, but some of you wrote as $1 - t^4$ so led to the wrong answer.

Question 2:

(1) $h(z)$ should be equal to a constant, then you may choose to let it be zero. Some of you just let it be zero directly.
(2) It is not necessary to calculate the curl of $\boldsymbol{F}$ as you have already found a f such that $\boldsymbol{F} = grad\ f$ so the line integral is path independent.

Question 3:

(1) The integral is on a circular disk, but some of you wrote the double integral as $\int_0^a \int_0^a$, which is the integral on the square $[0, a] \times [0, a]$.
(2) Some didn't know how to calculate the area.
(3) It was asked to verify the Green's theorem, which means both two hand sides of the Green's theorem should be calculated. But many of you just calculated one hand side. Some calculated both hand sides but got the final result wrong.
(4) In part (B) the closed circular curve is given in Cartesian form, therefore the parametric representation should be found by yourself. Some students may not know how to calculate the integrals but you should be able to write the parametric equation for the circular disk, which also get some marks for you.
(5) $dxdy = rdrd\theta$, some omitted the r.

Question 4:

(1) The normal vector is $\boldsymbol{N} = \boldsymbol{r_u} \times \boldsymbol{r_v}$, some used the opposite sign for the second component of the cross product so all the following calculations got wrong.
(2) Some wrote $\frac{1}{4} - \frac{1}{3} = \frac{1}{12}$!
(3) Some wrote $\boldsymbol{F} =< x, y, z^2 >=< u, v, 1 >$, which is wrong.
(4) Some wrote $\int\int \boldsymbol{F} \cdot \boldsymbol{N} dudv = \int\int \boldsymbol{F}||\boldsymbol{N}||dudv$, which is obviously wrong. They mixed the first and second type of surface integral together.
(5) Some got the correct normal vector $\boldsymbol{N}$ but then crossed it as wrong answer!

Question 5:

(1) θ should be between $\pi/2$ and π, over half of you couldn't find the right values.
(2) Most of you cannot sketch the graph.
(3) $dv = rdrd\theta dz$, many omitted the r.
(4) The marks for this question was very low but a few got the full marks.
(5) z is: $\tan\sqrt{x^2+y^2} \leq z \leq 1$, in polar coordinates it should be $\tan r \leq z \leq 1$, not $r \leq z \leq 1$.

Question 6:

(1) Some calculated the normal vector by $N =< 2x, 2y, -1 >$, which should only be used in the first type of surface integral or when you use $x = u, y = v$ as the parameters.
(2) Some used the wrong direction for the normal vector, which should be outgoing.