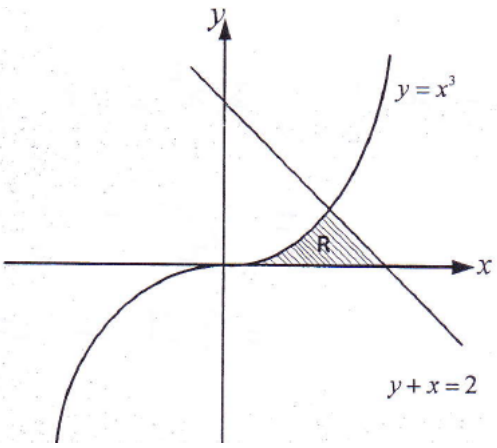
Faculty of Arts and Sciences
Department of Mathematics
MATH152 Midterm II

15.12.2017

Q-1) (10 Points) a) Reverse the order of the integration $\int_0^2 \int_{x^3}^8 f(x,y)dydx$ **(do not evaluate the integral)**

b) (10 Points) Describe the region R given in the figure and state the double integral $\iint_R f(x,y)\mathrm{dA}$ in any order **(do not evaluate the integral)**



Q-2) (20 Points) Find the equation of tangent plane and normal line to the surface $2zx+\sqrt{y}+xy^2=7$ at the point $P(2,1,1)$.

Q-3) (20 Points) Evaluate the following double integral $\iint_R 2x\mathrm{dA}$ where R is the region bounded by the graphs of the equations $y=x^2$ and $y=3x$.

Q-4) If $f(x,y,z)=y\cos x+z^3$ then

a) (10 Points) Find the directional derivative of f at the point $P(\frac{\pi}{2},2,1)$ in the direction of $u=\langle 2,1,-2\rangle$

b) (10 Points) Find the value of $\frac{dy}{dx}$ at the point $P(1,-1)$ if the equation $\sqrt{xy}+y\ln x-x^2+4=0$ defines y as a function of the variable x.

Q.5) (20 Points) Find all extrema and saddle points of

$$f(x,y)=\frac{2}{3}x^3+y^3-3x^2-\frac{3}{2}y^2+4x+8$$

Q-6) (20 Points) Use cylindrical coordinates to evaluate the volume of the region bounded by $z=11-x^2-y^2$ and $z=2$ **(see the figure).**